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FEBRUARY 1959

Volume 54 Number 2

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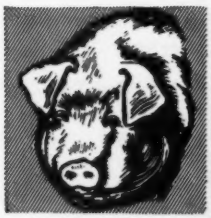

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Aluminum-sealed dropper bottles of 5 cc. Each cc. contains: 5.0 mg. of prednisolone 21-phosphate 5.0 mg. of neomycin sulfate (equivalent to 3.5 mg. neomycin base). Tubes of 3.5 Gm. Each gram of ointment contains: 2.5 mg. prednisolone 21-phosphate 5 mg. neomycin sulfate.	**Solution** 2 or 3 drops in the lower conjunctival sac three or four times a day. **Ointment** Apply a small quantity inside the lower lid three times a day.
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Crude dried broth of S. hygroscopicus *containing hygro mycin B when administered in the feed to swine wa found to possess anthelmintic effect against Ascaris an Oesophagostomum spp. No toxicity was observed.*

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Vol. 54 February 1959 No. 2

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Devoted to the Promotion of the Art and Science of Veterinary Medicine

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(prednisolone trimethylacetate CIBA)

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Dairy Cow	Ketosis (acetonemia)	Single 100- to 200-mg. injection*
	Shock ("downer" cow) syndrome	Single 200-mg. injection as supportive therapy.
Dog	Dermatoses	5 mg./10 pounds body weight, total single dose not to exceed 20 mg. For sustained therapy, repeat once or twice a week as indicated.
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*This initial injection may be reduced to 50 to 100 mg. intramuscularly if simultaneous administration of intravenous glucose is given, thus permitting more economical glucocorticoid therapy. If necessary, either regimen may be augmented by an additional injection of 50 to 100 mg. Ultracortenol after 24 to 48 hours.

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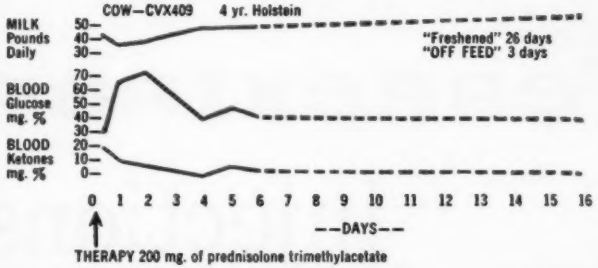
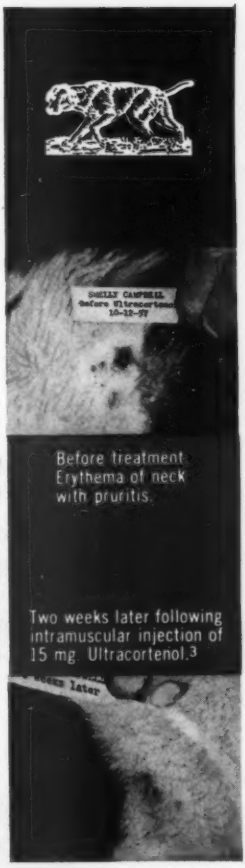
- appetite is restored, depression is dispelled within 12 to 24 hours[1]
- blood glucose levels are raised within 12 hours[1]
- blood ketone levels return to normal within 24 to 96 hours[1]
- a steady increase in milk production begins after 48 hours.[2]



This chart shows the good response in ketotic cow following intramuscular injection of 200 mg. of Ultracortenol. (Adapted from Vigue[1])

CANINE DERMATOSES Reporting on 9 animals (of whom 6 received 15 or 20 mg. Ultracortenol in a **single** intramuscular dose), Pollock[3] says, ". . . Ultracorten Trimethylacetate [Ultracortenol] proved effective not only against the seemingly innocuous lesions, but also against the hemorrhagic dermatitis associated with exquisite pain." And, "The duration of the anti-inflammatory phase varies from seven to ten days depending upon the dosage. . . ."[3]



Before treatment. Erythema of neck with pruritis.

Two weeks later following intramuscular injection of 15 mg. Ultracortenol.[3]

References: 1. Vigue, R. F.: J.A.V.M.A. 133:326 (Sept. 15) 1958. 2. Shaw, J. C.: Personal communication. 3. Pollock, S.: To be published. 4. Rabin, P. H.: Personal communication. 5. Hoffer, S. H.: Personal communication. 6. Weir, H. T., and Hazelrig, J. W.: Personal communication. 7. Beck, J. W.: Personal communication. 8. Bull, W. S.: Personal communication. 9. Fessenden, P. E.: Personal communication. 10. Lohmeyer, C.: Personal communication.

SUPPLIED: Multiple-dose Vials, 10 ml., each ml. containing 10 mg. or 25 mg. of prednisolone trimethylacetate in suspension for injection.

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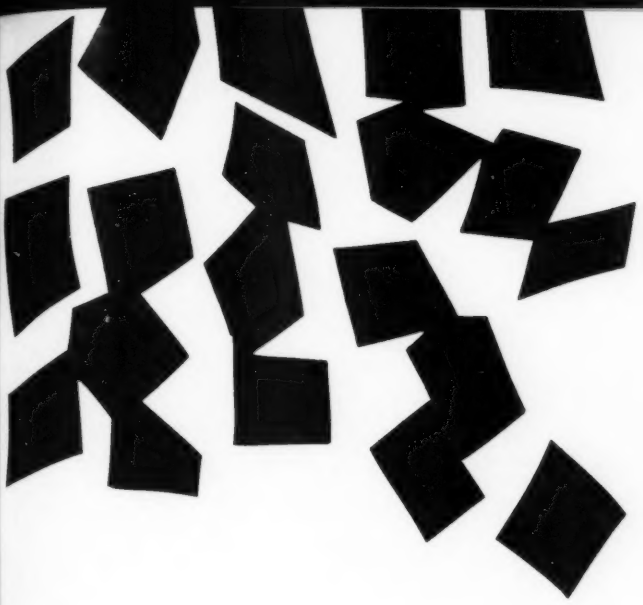

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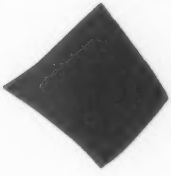

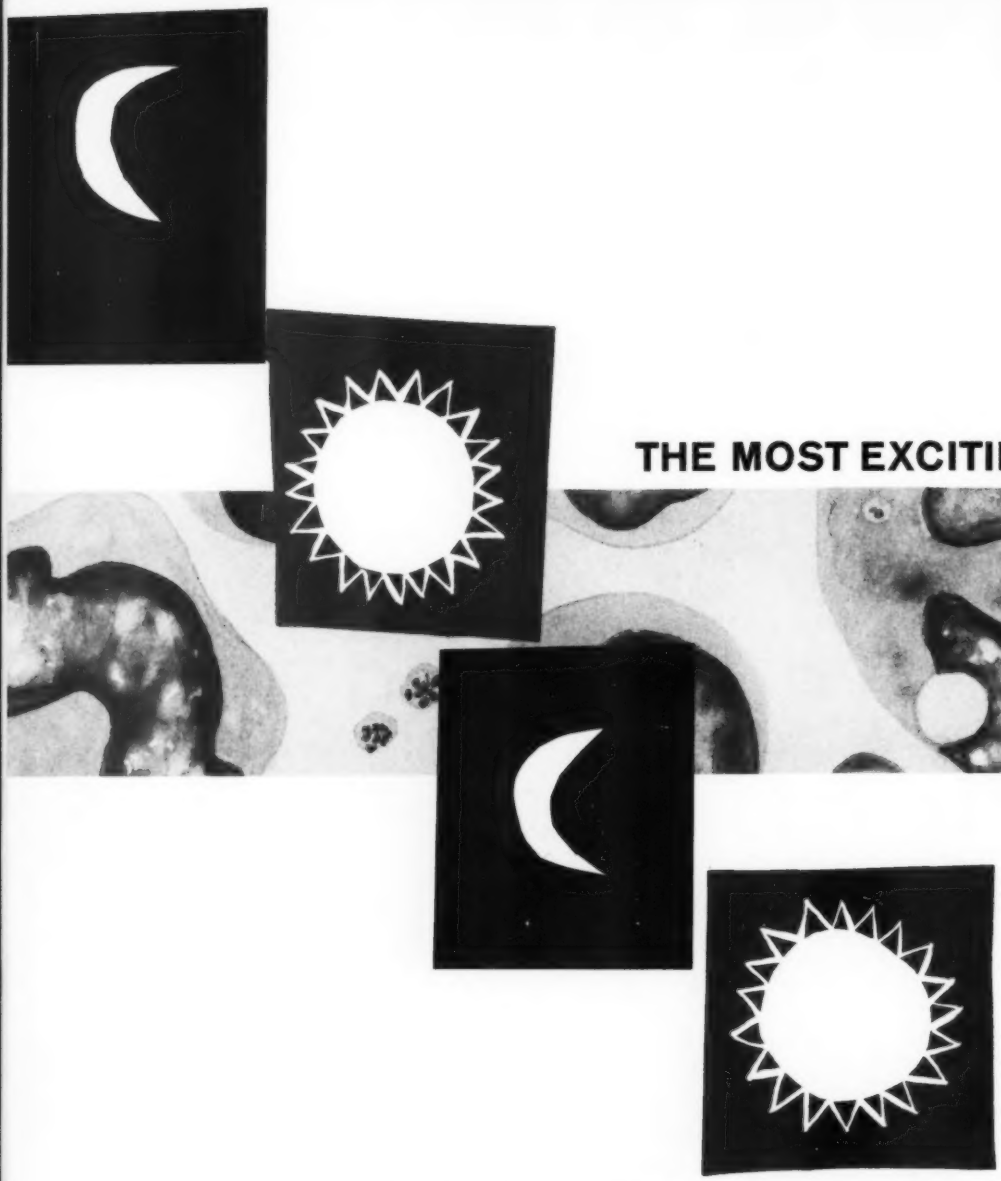

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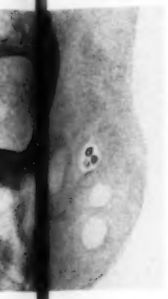

More than any other professional man, the practicing veterinarian knows that his most valuable asset is time. In any area of his practice, the success of his therapy cannot be measured by results alone; he is a busy man whose time must be used judiciously.

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In sum, SULFABROM represents the very latest advance in sulfa therapy. Effective against a full range of infectious diseases, economical to use by any standards, SULFABROM is your answer to the pressing problem of repeat calls and handling time in the treatment of almost any infection.

SULFABROM
Single-dose professional sulfa preparation granting effective blood levels lasting up to 48 hours.

1. CASE REPORTS IN MERCK & CO., INC., FILES.

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The "Constant-Level" Concept of Sulfa Therapy

The establishment and maintenance of a constant blood level is virtually necessary throughout a course of sulfa therapy.[1]

In the recent past this has meant frequent readministration of the sulfonamide in use, as most of these drugs were of short-range effectiveness. Once a day, the dose of sulfamethazine or sulfamerazine would have to be repeated in order to maintain therapeutically effective blood levels for another 24 hours.

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SULFABROM* is just such a preparation. Clinical studies prove that SULFABROM maintains prolonged blood levels in cattle after oral administration of doses of 1.5 grains of SULFABROM per pound of body weight.

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1. STOWE, C. H. ET AL.: AM. J. VET. RES. 19:345 (APRIL) 1958.

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1.0-1.5 grains/lb. of body weight, orally

SULFABROM Buffered Powder

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(Consult the package circular for full directions for preparing an intravenous or intraperitoneal injection of SULFABROM.)

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*Belloff, G. B.: Calif. Vet. 9:16 (Nov.-Dec.) 1956.

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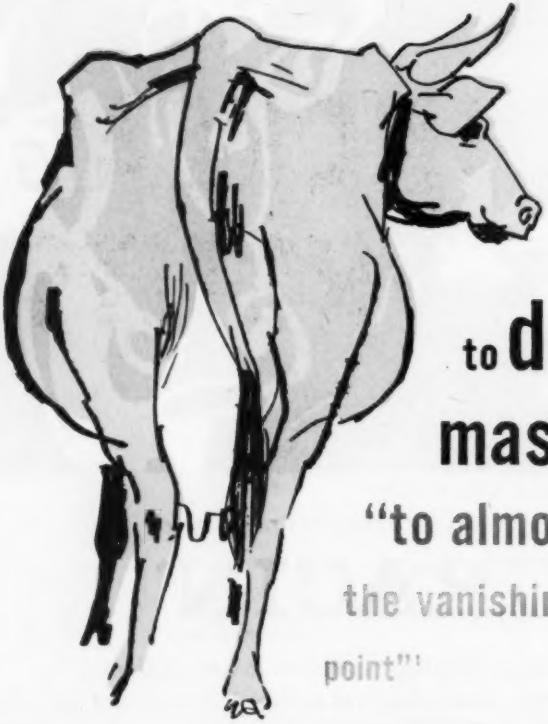

to decrease mastitis "to almost the vanishing point"[1]

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Furacin with penicillin produces an enhanced antibacterial action that is at least additive, and may be truly synergistic. The combination covers a broader bacterial spectrum of gram-positive and gram-negative organisms than either agent alone.

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SUPPLIED: A crystalline suspension of Furacin 2% and procaine penicillin G (13,333 units per cc.) in peanut oil with aluminum stearate 3%. In rubber-capped vial of 100 cc.; applicator tube of 7.5 cc., box of 12.

1. Kakavas, J. C., et al.: J. Am. Vet. M. Ass. 119:203 (Sept.) 1951.

NITROFURANS—a *new* class of antimicrobials—neither antibiotics nor sulfonamides

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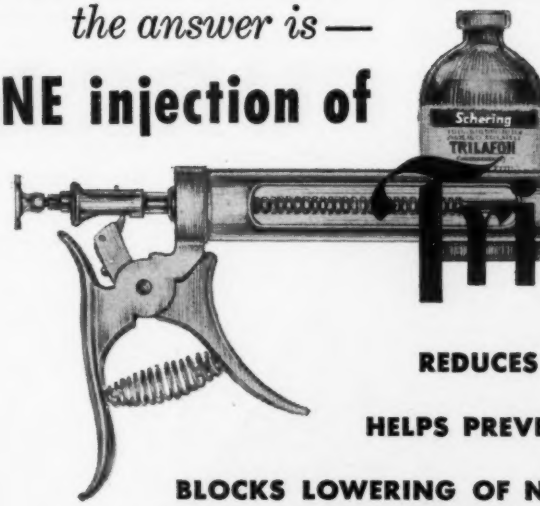

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*Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

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REFERENCES: 1. Bull, W. S.: N. Amer. Vet., In press. 2. Henry, R. T., and Blackburn, E. G.: Vet. Med., In press.

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News Comment

Bone Fracture Recovery

A plastic material — a polyurethane polymer known as Ostamer — permits weight bearing on fractured bones within 48 hours after application, according to report delivered before the American Association for Surgery of Trauma. The liquid plastic forms a chemical bond with bone surfaces to be bridged and becomes an intimate part of the bone, and is thus distinguished from glue, adhesive or cement-type bonding. Ostamer has been used on human patients with "satisfactory results." Clinical use on human beings followed extensive experimentation with animals.

Salt for Dogs

Iodized salt is helpful in reducing any tendency a dog might have towards developing goitre. Salt is also reported to lessen a tendency towards miscarriage.

A mixture of half teaspoon of salt with a little warm water makes an emergency treatment for a poisoned dog. Salt and water mixture forced down a dog's throat will make the animal regurgitate. Plenty of milk and egg whites concludes such emergency treatment.

A salt and soap solution helps to control the eggs of parasitic worms around the dog's pens. Four cups of salt, one cake of laundry soap and 1½ gallons of warm water make a solution with which to saturate the ground around the run and the dog house.

Chemical Agent Eliminates hepatitis in plasma

A new chemical agent which will eliminate hepatitis in blood plasma transfusion has been discovered by research workers at Henry Ford Hospital, Detroit. The new agent known as Betaprone is also used to sterilize blood vessels, bone and cartilage. A member of the research team, Dr. Gerald A. LoGrippo, said that the new chemical is finding wide use in the sterilization of biological materials and particularly in products which could not be sterilized before. No one of over 600 patients

receiving plasma transfusions at Ford Hospital has contracted hepatitis during the seven-year use of Betaprone. The agent is the highly distilled byproduct of beta-propiolactone which is used in its raw form in the manufacture of plastics and rubber products.

Pneumonia and Shipping Fever

A relationship exists between pneumonia in calves and shipping fever in cattle, according to a report from the Ontario Department of Agriculture. Many animals seriously affected with shipping fever have a chronic type pneumonia, it was observed, prior to shipment. Observations suggest the occurrence in the normal cattle population of an enzootic pneumonia of a chronic nature.

Egg Eating

A Vermont poultryman has provided an interesting observation concerning chickens that eat eggs. By adding vinegar to the flock's drinking water, egg eating stops within three days.

Caked Udders

Heavy demands for protein as the colostrum is formed when cows freshen may be a factor in causing caked udders, according to scientists at the Illinois Experiment Station. Experiments involving feeding of high protein levels just before calving suggest that udder edema can be controlled. Trials are continuing.

Sex Control

Bone Transplants

Research now being conducted at Michigan State University indicates that it may be possible to obtain a larger percent of either males or females of cattle, chickens, rabbits or other animals. In experiments with rabbits, results were achieved through electrophoresis. Spermatozoa in a salt solution migrate to either the positive or negative pole. Seven of 31 litters of rabbits obtained were all of one sex. Another suggested control in mammals proceeds on the basis of blood pH with acid lines producing an excess of females, and alkaline lines, an excess of males.

"Sorehead" of Sheep

Either ET-57 (Trolene — Dow Chemical) or piperazine will cure advanced cases of "sorehead" of sheep, according to USDA scientists. This is surprising since the compounds are quite different.

Checking Hog Weights

Weights of hogs should be checked at least four times, according to Purdue University animal husbandrymen. Accurate weights — rather than guesswork — at birth, weaning, 135 days, and just prior to marketing give a good indication of "doing ability" of pigs, the sow's milking ability, and the feeding program and management ability of the farmer.

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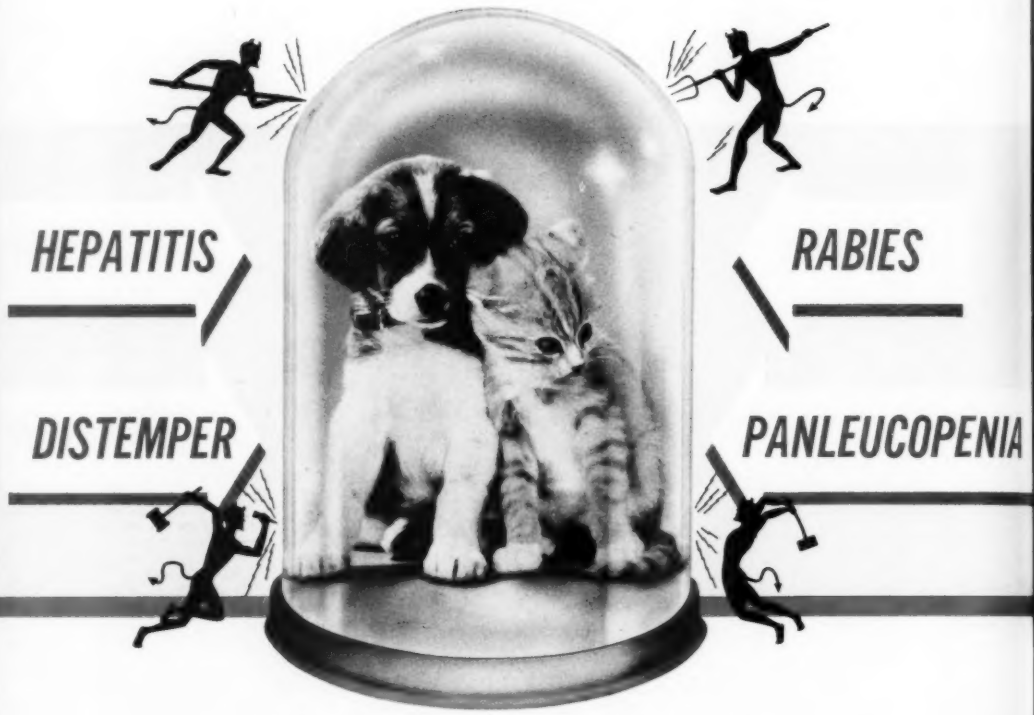

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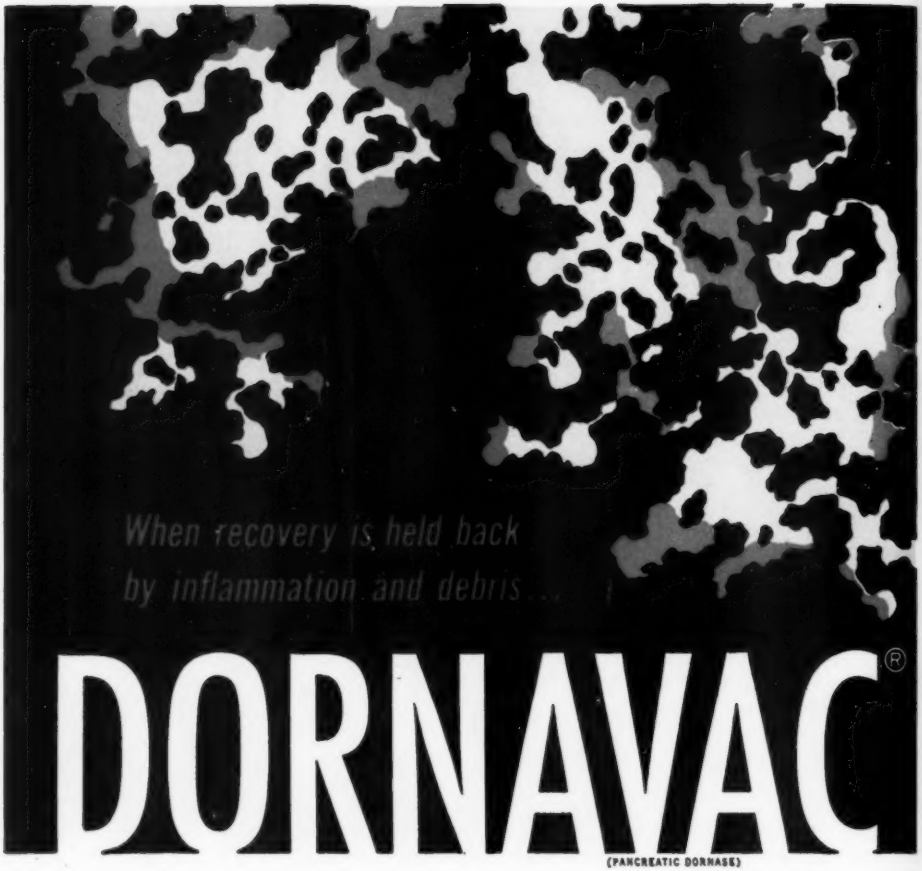

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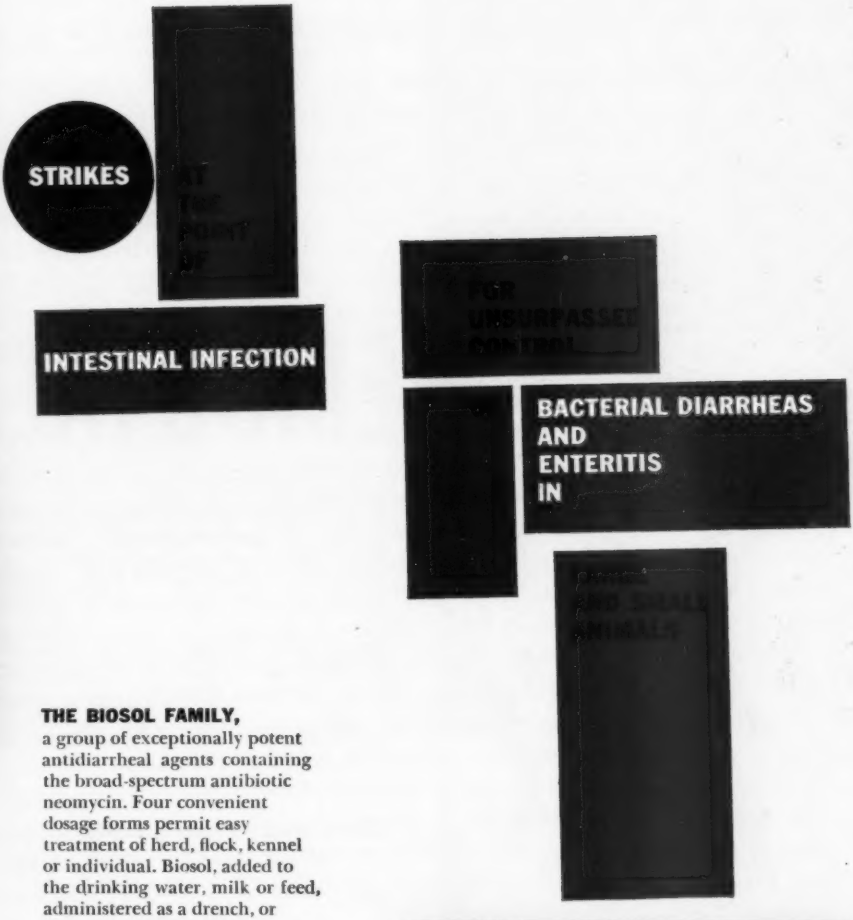

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• • • • •

"Pump. The vacuum pump should be the correct size for the number of units being used. For instance, if a dairyman plans on using only two milker units at any one time and his installation is not too long or complicated, then probably a two-unit pump will be satisfactory. However, it might be better to install a pump of slightly greater capacity than will be required. Then, by the use of vacuum control regulators, the vacuum can be maintained within the range recommended by the manufacturer. A poor or undersized pump may provide too low or a fluctuating vacuum. This will result in slow milking, a frequent cause of trauma to the teats and udder. A pump with the correct capacity maintains a uniform vacuum on the pipe line at all times with or without the milker units in operation. Recovery from the loss of vacuum during changing of units is rapid."

Of all the "Mechanical Faults" mentioned in paragraph one, vacuum pumps that are too old or worn or too small come very close to heading the list... and... far too many cow-milking men are in pump trouble and don't know it.

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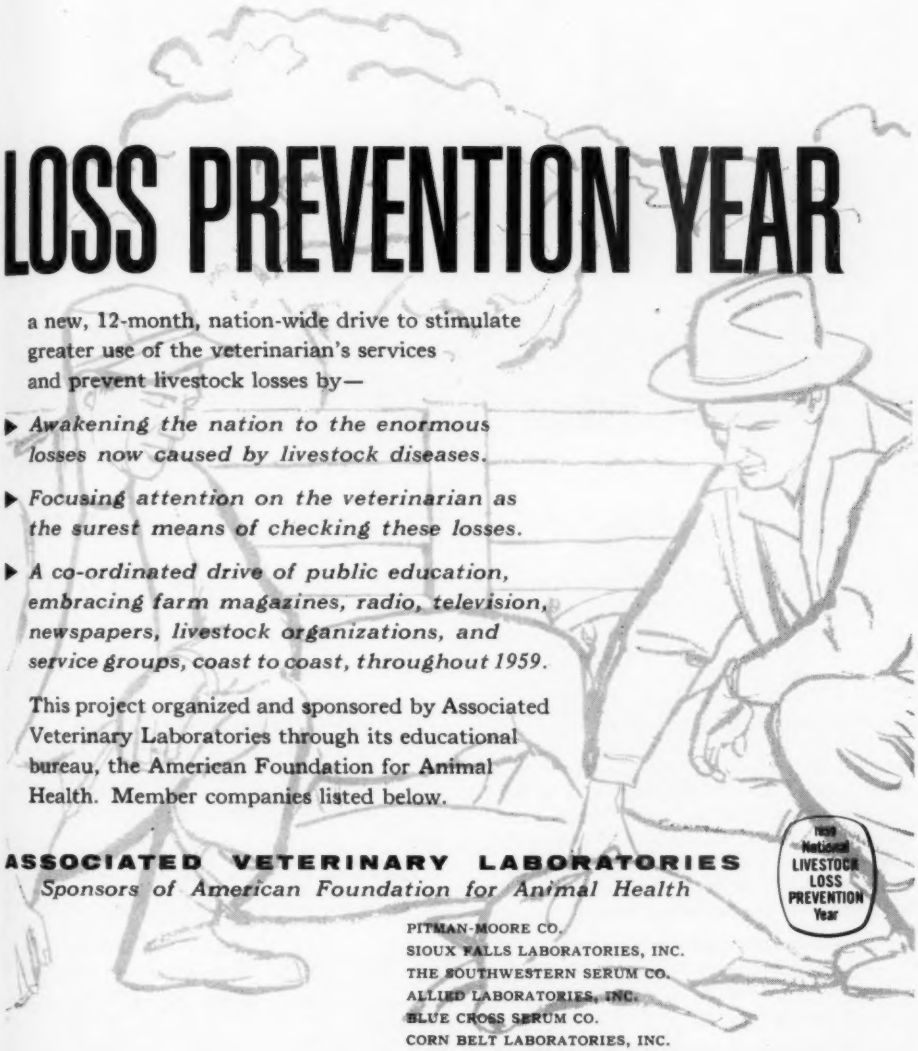

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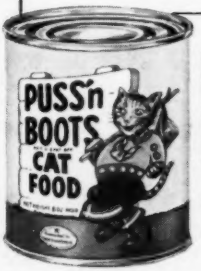

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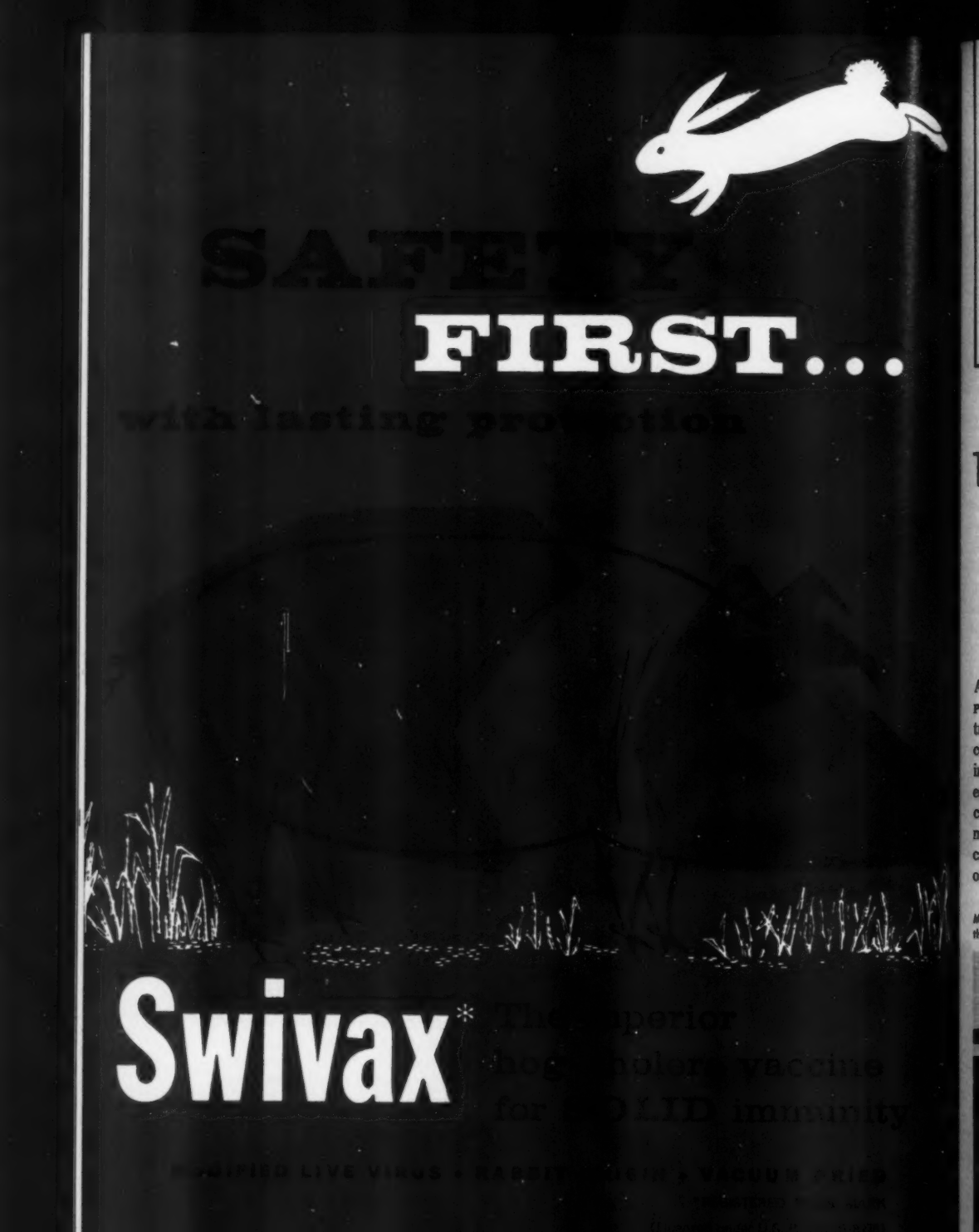
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With economic trends pointing to larger feedlot operations, veterinarians are being confronted with an increasing demand for professional service. The writer has assembled here some of the more common disease conditions with which the large animal practitioner is confronted. With restraint of primary importance, specific recommendations for management of feedlot disease conditions are presented.

Treatment for Feedlot Diseases of Cattle

D. R. MACKEY, D.V.M.

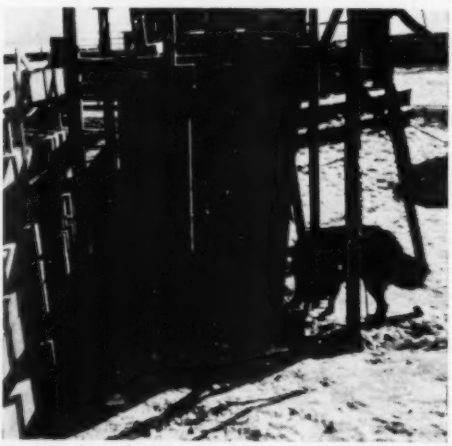
Greeley, Colorado

A SATISFACTORY SOLUTION TO RESTRAINT PROBLEMS is half the battle in successfully treating feedlot cattle. The days of the cowboy and roping of feedlot animals are in the past. At least 75% of feedlot diseases are of a respiratory nature; therefore, catchpens and chutes to facilitate treatment are of prime importance. Every precaution must be taken to minimize exertion of the patient.

I insist that owners separate all sick animals that are able to walk, and place them in catchpens before my arrival. The presence of strangers and the smell of medicine excites the rest of the cattle in the lot, making it difficult to isolate sick animals after arrival on the premise. There is also the hazard of the veterinarian transmitting disease from lot to lot regardless of how careful he may be; therefore, I believe that

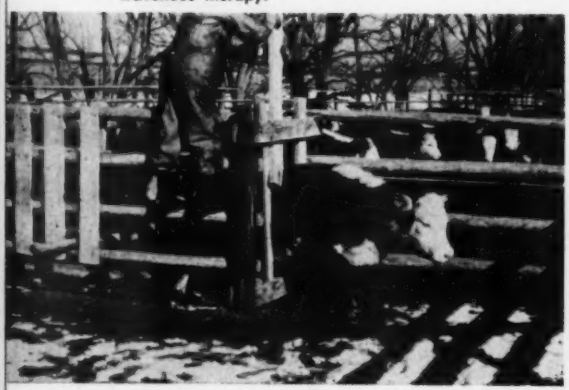
Many home-made chutes are preferred for feedlot treatment. A runway at least 20 ft. long and 30 in. wide on the inside with a regular 2 x 6 ft. stanchion is satisfactory. A side gate is valuable for safety and convenience.

Sick animals should be isolated before the veterinarian arrives. This ideal isolation facility allows vitally needed ventilation plus shelter. Every precaution is taken to minimize exertion of the patient.



Crossmembers for the stanchion should be placed on the ground for largest possible opening.

This construction makes it easier for the animal to see and put its head through and prevents choking. High crossmembers increase jugular pressure and impede intravenous therapy.



it is not his place to be in the main lots separating and treating sick animals. If he can restrict his activities in these feedlots to isolation pens and treatment chutes, better control of diseases is possible.

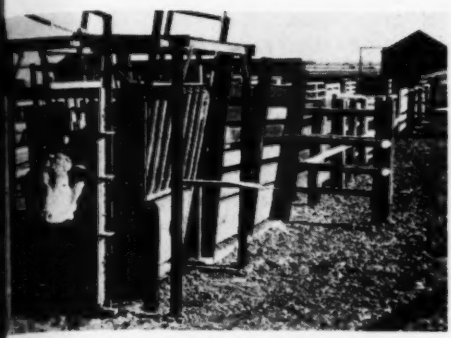
Many home-made chutes seem preferable to commercially manufactured ones for feedlot treatments. A runway at least 20 ft. long and 30 in. wide on the inside, with a regular 2 x 6 ft. stanchion in the front is satisfactory. Crossmembers for the stanchion should be placed on the ground. This makes the opening as large as possible and easier for the animal to see and put its head through. This also prevents choking and facilitates intravenous administration of medicants. High crossmembers and gates on the front cause increased jugular pressure inhibiting gravity flow of any medicant used intravenously. A side gate on either side is valuable since it can be used to release animals from the chute or simplify examination of the thorax, abdomen and extremities. There are three commercially made cattle chutes available in Colorado that meet these specifications. They are the Gunnison, Powder River, and the Silver King.

Pregnancy Examination

Pregnancy examination of feedlot heifers has become a good practice builder in the Colorado area. This is one type of feedlot work in which a commercially available chute is preferred to most home made stanchion types. The reason is that one can drop a side rod on one of these chutes to examine the heifer without walking in behind each one. With a good chute, and the heifers starved out, one can do 75 or more an hour.

Many unfavorable conditions can result from heifers calving in the feedlot. Necrotic vaginitis resulting from severe bruising at time of parturition is common in animals with too much peri-vaginal fat. A heifer calving in the feedlot at the time of marketing will delay shipping for three to four weeks. A pregnant heifer sent to market will under sell other fat heifers by 3 to 5 cents. The advantage of aborting such heifers as early as possible can readily be seen.

I prefer plastic sleeves rather than rubber



A chute with drop bars is preferred for pregnancy examination. With a good chute and heifers starved out, 75 or more may be examined per hour.

sleeves for this work, because the rubber sleeve tends to work up on the arm and shut off circulation, causing numbness in the hand and arm. I have the animals taken off feed for a period of 24 to 36 hours prior to examination. Water is allowed. A repositol base stilbestrol is used to induce abortion in these heifers. Dosage, which is dependent upon the size of the animal and the stage of pregnancy, ranges from 100 mg. to 150 mg.

I discourage abortion for animals six months or more pregnant because of unfavorable sequela, such as vaginitis, retained placentas, emphysematous fetus, and greatly lowered efficiency. I also discourage the practice of running all animals through and giving them an injection of the abortifacient without a manual examination. It induces estrus for one week and if some are over six months pregnant the above unfavorable responses may result.

In the Colorado area open sheds are preferable to closed buildings for hospital pens. A sick animal maintained in a closed building for several days and then turned back into the lots will often suffer a relapse, whereas animals maintained in open sheds do not have a tendency to get too warm. It must be remembered that feedlots discussed here run up to 25,000 head of cattle at one time.

Common Feedlot Disease Conditions

Diphtheria. This disease condition is common in Colorado feedlots and responds nicely to treatment with Terramycin, sulfapyridine or sulfathiazole, or any mixture of these; however, in our area one treatment usually is not sufficient. Treatment is usually required 2 or 3 times. A complication following diphtheria, other than chronic wheezing, is abomasal ulcers. Black tarry feces resulting from hemorrhage of the ulcer is a predominant sign. Sulfapyridine administered orally is most satisfactory for this condition.

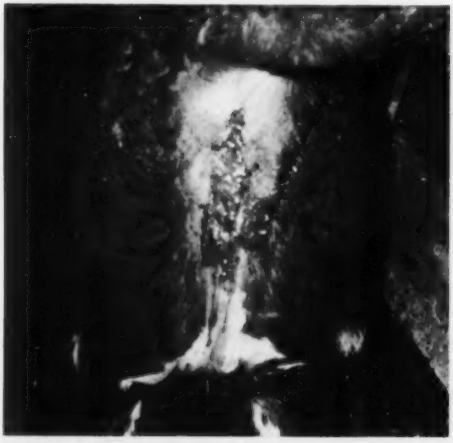
Infectious Rhinotracheitis. This condition invaded Colorado feedlots in 1951. In time it became the difference between profit and loss in the feeding industry. The disease usually is preceeded by a moist, deep cough in the herd, a decrease in amount of feed consumed, nasal discharge of a mucoid nature containing blood or a sanguis fluid. Severe symptoms in individual animals usually follow in five to seven days. These symptoms are of a septicemic nature with nasal and ocular discharges, dypsnea similar to diphtheria on both inspiration and expiration, except that it is a nasal dypsnea rather than a laryngeal dypsnea. In advanced cases a great deal of toxcity and cyanosis is evident. Some animals may even be down. Autopsy reveals severe diphtheria-like lesions on the surface of the turbanates and the trachea, with some mechanical pneumonia. This disease must be differentiated from diphtheria, malignant catarrhal fever and mucosal disease. Treatment varies even in one's own practice, because what will work in one lot will not work in another. Broad spectrum antibiotics administered intravenously, plus antihistamine and expectorants, are preferred treatment. In advanced cases the intratracheal administration of proteolytic enzymes is indicated. Vaccination is an effective means of control.

Downer Cattle. This condition is common in the feedlots and it takes a great deal of clinical experience coupled with autopsy findings to enable a practitioner to diagnose the cause. Determination of the cause is very important in deciding whether to treat or to send to slaughter an individual animal, and what to do as a herd treatment.

Entero-toxemia. This is becoming one of the most important causes of downer cattle and, of course, the type of symptoms presented indicate the type of toxin in most cases. If these animals are not running a

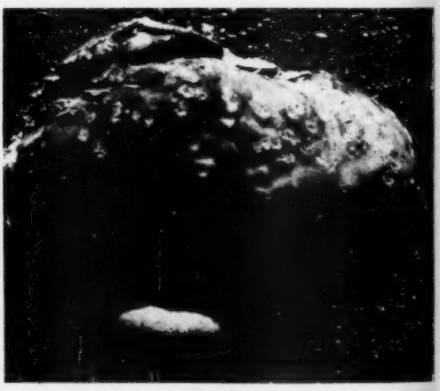
fever, almost all will pass inspection at slaughter. Herd treatment consists of putting the lot on Dynafac (Armour) at rate of 1 oz. per head per day for five days; dose is cut in half for five days, and then animals are fed at recommended level for remainder of feeding period. Once symptoms are observed, treatment is of no avail. Injuries to the spine from slipping and riding or abscesses from grubs, fractures, etc., are common. Infectious rhinotracheitis can cause downers also. Other causes are founder, peritonitis from liver abscesses and foreign bodies.

Coccidiosis. This is a common disease condition of feeder cattle, and usually follows a period of damp weather. Approximately five to seven days of warm weather following dampness seem to precipitate coccidiosis. The disease can take on epizootic proportions. Most owners think the heavy feed they are feeding is the cause of the condition when actually it is only a contributing factor. An operator who has adequate feedlot experience knows how to detect animals responsible for the trouble. The most telling sign is that of tarry feces clinging to the buttocks, and fresh blood in stools; however, at this stage the animal has probably been ill for several days. Medicated enemas are preferred treatment and certainly superior to anything orally administered in cases involving bright red blood in the stool. Bright red blood indicates pathological alterations in the rectum, and any medicament that is administered orally will probably be of little value by the time it reaches the rectum. I like to give an enema containing 2 oz. sulfaquinoxilin, 3 ounces of Cornhusker (Corn States) 2 to 4 oz. of tincture of iodine or potassium permanganate and 2 quarts warm water. I prefer a koroseal tube to give these enemas because they become soft when warmed with the enema solution and warm water. One must be careful in giving these enemas to avoid perforation of the colon. I insert the tube as far as four feet and pump the solution in slowly. If the patient is exhibiting tenesmus, an epidural of 1 to 2 cc. of isopropyl alcohol is indicated. Appropriate herd treatment should consist of cutting down on the grain ration, using prairie hay, and possibly medicating the water with Cornhusker, Eltras Powder (Haver-Lockhart) or Dynafac (Armour) mixed in grain at rate of one ounce per head per day for five days.



Experienced lot operators can spot tarry feces on buttocks and fresh blood in the stool typical of coccidiosis.

Liver Abscesses. Abscesses causing peritonitis can be a common disease entity in the feedlot. The characteristic symptoms resemble those of traumatic gastritis, except that most of the tenderness is on the right costal arch and yellowish diarrhea is usually evident. These two symptoms differ from traumatic gastritis, wherein tenderness is usually on the left costal arch or sternum with constipation. Treatment consists of daily injections for five to seven days of 5 to 15 gm. of Streptomycin, plus sodium iodide administered intravenously on the first day. Many of these animals make a



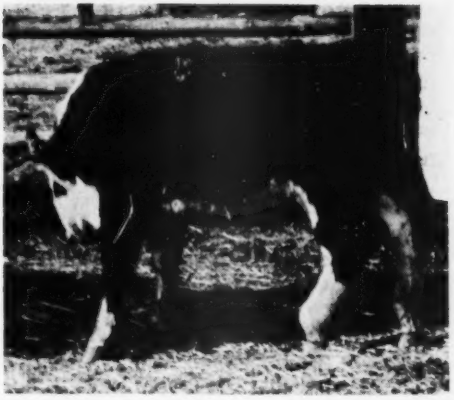
Liver abcesses can be a common feedlot problem. Shown here are typical lesions.

satisfactory recovery and continue to gain weight; whereas, others make no further gains. Colorado State University, under Doctor Jensen, has shown that bringing animals to full feed too fast causing rumenal ulcers has a direct relationship on abscessation of the liver. They have also demonstrated that continued feeding of antibiotics tends to reduce the incidence of liver abcesses.

Mucosal Disease. This disease, as reported in Illinois and Indiana, has never occurred in Colorado. By this, I mean that we do not have the type that reaches epizootic proportions. We are confronted with individual cases which exhibit the same symptoms but it does not seem to spread. The type of mucosal disease we see is similar in many instances to infectious bovine rhinotracheitis. The difference is that mucosal disease affects the alimentary tract and infectious bovine rhinotracheitis affects the respiratory system. Both diseases start with a febrile reaction, ocular and nasal discharge. Treatment seems to be of no avail in our type of mucosal disease; however, if caught early and the temperature reduced, many animals will pass for slaughter.

Bloat. This condition, either the acute or chronic type, can become quite a problem in certain lots of cattle. In the chronic type of bloat, of course, the first thing to determine is whether or not there are strictures in the esophagus resulting from diphtheria, rhinotracheitis or other trouble. If present, slaughter is the only solution. Otherwise, I find rumen transfusions to be of a great benefit. Acute bloat in a different animal each day causes nervous exhaustion for the lot owner when no specific cause can be found. The use of commercial detergents such as Tide at the rate of one tablespoonful per head per day thoroughly mixed in the feed will help a great deal in controlling this problem. The addition of some dehydrated material stuff to help take up the moisture also seem to be of some benefit.

White Muscle Disease. This condition in feeder calves may be a distinct disease entity or may follow other acute illnesses such as shipping fever, pneumonia, diphtheria, or infections rhinotracheitis. Relaxation of the muscles of the hind legs,



Cocked ankle is a common sign of white muscle disease in feedlot cattle.

causing a cocking of the ankle is an important sign. On autopsy, a cross section of the leg muscles will find one muscle of a pork color with the others normal. Treatment consists of good nursing and the injection of 300 to 500 units of vitamin E every other day for three to eight doses. Animals that are down can very often make a satisfactory recovery after receiving this treatment.

Buller Steers. These animals are a continuing problem in the feedlot. The best solution is to take the steer that is being ridden and put it in a lot of heifers or in a small pen by itself. Some lots become so

Hairless patches caused by buller steers are evident in cut above.

affected with this problem that even isolated steers start to ride each other. Various preparations can be used to counteract this condition. Some work well in certain cases, but not in others. One of the oldest treatments is to spray the steer that is being ridden with almost anything to change its body odor, and then in a day or two try to work it back into the lot. Other times spraying the entire lot of cattle will stop the trouble. Repositol type progesterone or testosterone can be of benefit, but the cost of the drug prohibits its routine use.

Leptospirosis. This disease condition is rapidly attaining staggering proportions as a threat to feedlot operations. Vaccination seems to be effective. For treatment I find massive doses of Streptomycin, 5 to 15 gm. and blood transfusions helpful. If animals seem to be wild, the less they can be disturbed the better. In these cases blood transfusions are not attempted because exertion in restraining the patient will cause death.

Foot-Rot. It may be limited to an occasional case or may breach epizootic proportions. For individual treatment, intravenous or oral Sulfapyridine is preferred. If the owner wishes to treat his own animals for this condition, we dispense Sulfapyridine boluses. This is a good method for getting the owner to build treating stanchions, since after a few treatments he will be looking for an easier way to treat each case. For herd treatment, or better prevention, the use of organic iodides mixed in the grain at the rate of 2 lb. per 100 head of animals for 10 days then reduced to 1 lb. per 100 head for the remainder of the feeding period. One must realize that in the face of an outbreak that it is going to take 2 to 3 weeks for the iodide to give results. In a lot that seems to have foot-rot problems routinely, it is best to put each new shipment of cattle, as they arrive, on the organic iodide rather than wait for the condition to appear.

Pneumonia and Shipping Fever. This complex, especially in calves coming into the feedlot, can become quite a demanding condition. For herd treatment, I prefer sulfathiazole sodium in the drinking water at the rate of one pound per 100 gallons of water but not to exceed more than ½ gr. per pound of animal in a 24 hour period. If more water is needed, give clear water. This is done for two days, then if necessary dose can be cut in half for another two days. As an alternative, one can use Aueromycin (American Cyanamid) or Terramycin (Pfizer) in the feed at the rate of 1 mg. per pound body weight for five to seven days, then ½ mg. per pound for five to seven days more, and then ¼ mg. per pound body weight for another five to seven days. For individual treatment, the broad spectrum antibiotics with antihistamines and expectorants are preferred especially in the pneumonic state; however, in the septicemic stage, most any sulfa or antibiotic seems to work.

Colic

The term "colic" has lost its original meaning. From the Latin "colicus" or the Greek "kolikos," it was a spasmodic affection of the intestines, particularly the colon. In the horse, strictly used, the word was reserved for enteralgia, but has grown to designate innumerable diseases the only common element of which is abdominal pain. There is no necessity to apologize for the term, however, because it encompasses a large but definite group of anomalies that would otherwise be difficult to characterize. —*Kenneth B. Haas, D.V.M.*

Listeriosis in Fowl

Gray of the Montana Research Laboratory, writing in the August 1958 issue of *Avian Diseases* states that in fowl listeriosis is frequently associated with other disorders. Primary avian listeriosis is usually a septicemia with mycardial and/or hepatic focal necrosis. Infected fowl may serve in the transmission to man, as well as to animals and feeds containing an antibiotic may be an effective preventive in fowl.—*R. R. Dykstra, D.V.M.*

Advantages of aqueous solutions or emulsified bases for intramammary infusion of antibacterial agents are discussed. A safe, economical emulsifier is described that can be added to mastitis infusions by the veterinarian for improved distribution and optimal antimicrobial activity in the udder.

A Practical Mastitis Infusion Addative

R. F. VIGUE, D.V.M.

Springvale, Maine

THERE IS INCREASING EVIDENCE to indicate that ointments are not the most ideal mastitis infusion vehicles. It is well established that vehicles which do not dissolve in water will not dissolve in milk, which is an aqueous secretion of 88% water. Full benefit of antibiotics or other chemotherapeutic agents for intramammary use cannot be realized if the vehicle fails to dissolve and completely release the antibacterial substances.

Professor Mills of the University of Georgia, School of Veterinary Medicine, recently expressed his views on vehicles.[1] He stated: "The more mastitis we treat, the more convinced we become that udder infusion with oily vehicles is not desirable. Preparations in which oily masses cannot be massaged up into the swollen gland, causing oil to be milked out for days afterward are far from ideal." Schipper of the North Dakota Argicultural College has reported on the disadvantages of using ointment bases in mastitis infusions.[2] In an extensive study he compared the two general types of vehicles most widely used, ointments and aqueous solutions, on the basis of intramammary penetration. He summed up: "A more uniform distribution of antibiotics throughout the infused quarter following use of aqueous solutions was observed. In some instances, massive quantities of ointment vehicles were found adhered to the teat wall some 24 hours after administration. Massaging of the infused quarter immediately after administration of ointment preparations gave no indication of aiding penetration. In one instance, ointment was found in the outpocketing of the lower mammary gland six weeks after the infusion."

Although evidence shows that ointment vehicles actually afford higher concentrations of antibiotics than aqueous solutions or emulsified suspensions following milking, (1) some of these vehicles may be concentrated in the lower part of the gland, (2) such vehicles are poorly soluble, (3) such vehicles do not disperse their antibacterial agents readily, and (4) such vehicles may not release their entire chemotherapeutic activity in the gland.

Feldman[3] of the Mayo Foundation has observed "untoward reactions following the administration of antibiotics suspended in oil, including the development of indurated

nodules in the quarters that received the antibiotic-oil medicaments." He is of the opinion that: "In the granulomatous nodules which have developed in the udder following treatment with such preparations, the lipoid constituent apears to be the significant component of the mixture."

Previous studies in which antibiotics and adrenal corticosteroids, singly and in combination, were evaluated in the treatment of mastitis indicated that use of aqueous vehicles was superior to oils or ointments.[4] It was also pointed out in the same studies that the addition of small amounts of wetting agents (surface active agents) definitely enhanced the antibiotic and antiphlogistic activity of the infusions.

The primary object in the treatment of bacterial mastitis is to obtain contact between the antimicrobial agents and the invading organisms. This can best be accomplished by the use of vehicles which disperse and penetrate. Lowering of the surface tension of the vehicles by the use of surfactants greatly augments this spreading or wetting effect. Thus addition of small amounts (1 to 5 cc.) of such surfactants as polyoxyethylene sorbital monoöleate (Tween-80 — Atlas Powder Co.) to the mastitis infusion preparation results in the vehicle spreading rapidly through the gland. Because of the lowered surface tension and affinity for fatty elements of such detergent-antibiotic mixtures, there is greater penetration and dispersability of the chemotherapeutic substances.

Surface Tension

The simplest way to visualize the theory of surface tension is to float a needle in a tumbler of water or milk (fig. 1). It is apparent that the resistance of the surface of the liquid (water in this instance) to rupture is actually strong enough to support the weight of the needle. In other words, the molecules of the water possess sufficient attraction to each other at the surface to prevent the needle from falling through between them. When a small quantity of surface active agent such as Tween-80 is added to the tumbler, the tension between the molecules of water at the surface is lowered, or relaxed, and the needle sinks

Fig. 1. The resistance of the surface of the water (or milk) to rupture is actually strong enough to support the weight of a needle. Molecules of water or milk possess sufficient attraction for one another to prevent the needle from falling between them.

(fig. 2). Through the use of this phenomenon in mastis infusions it is possible to increase the spreading, dispersing, and penetrating effects of chemotherapeutic agents. The remarkable spreading action on liquids of Tween-80 is shown in figure 3.

Toxicity Studies

In toxicity studies with Tween-80, as much as 100 cc. was injected following each milking into quarters of normal cows for periods of ten days. There was no evidence of irritation or other untoward effect. Doses up to 50 cc. have been injected into acutely swollen quarters with no untoward effect. In this amount the agent appears to possess a weak antibacterial action.

This particular surfactant has received extensive pharmacological investigation over the past two decades by Krantz and his associates[5] at the University of Maryland. Data has been presented to show that prolonged feeding and continual application to skin and mucous membranes are harmless. Because of its marked emulsifying and water-dispersible nature as well as its nontoxic and nonirritating properties, Tween-80 is widely used in foods, candies, cosmetics, and pharmaceuticals. The usual amount added to our infusion preparations is 1 to 5 cc. Vehicles used as carriers of antibiotics and other chemotherapeutics in these studies include sterile water, Meremeth (Sharp &

Dohme), Neoprontosil (Winthrop), and Sulfatose (Norden), and Suljex (Pitman-Moore).

Summary and Conclusions

The use of aqueous solutions or emulsified bases is preferred to ointments or oily vehicles for infusions of antibacterial substances into the udder. Advantages include better dispersion, more complete release of antibacterial substances, and superior clinical results.

The addition of small quantities of surface active agents such as polyoxyethylene sorbital monoöleate (Tween-80) to the infusion preparation enhances spreading and penetration of the vehicle, assuring optimal antimicrobial activity.

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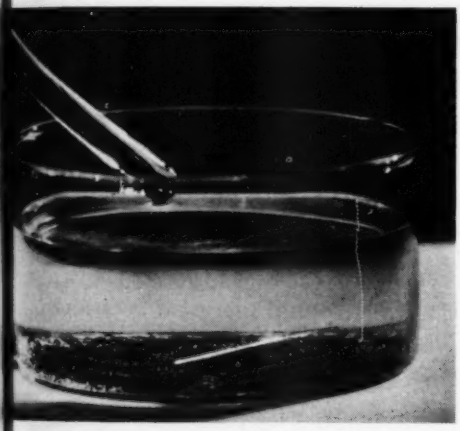
EDITOR'S NOTE: *Fear of contamination of the nation's milk supply has virtually closed the door to new improvements and developments in the field of mastitis infusion therapy. F.D.A. concern is reflected in the increasingly stringent standards for all new developments. Unfortunately vehicles and products that have been in use for some time have not undergone similar stringent re-evaluation. In future issues of* VETERINARY MEDICINE *additional information establishing serious side effects of currently recognized oil vehicles will be presented. There is urgent need for official recognition of these faults.*

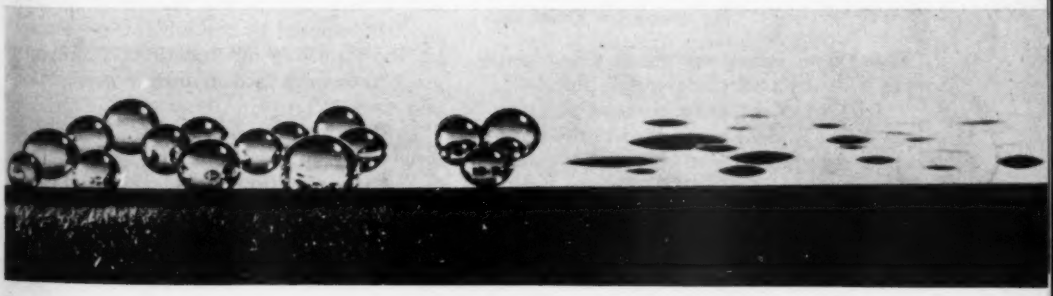


LEFT

Fig. 2. When a surface active agent such as Tween-80 is added to the water or milk, the tension between the molecules at the surface is lowered, or relaxed, and the needle sinks. This property of surfactants can be taken advantage of in increasing dispersibility and penetration of infusion vehicles for intramammary use.

BELOW

Fig 3. Illustrating the "spreading effect" of a surface active agent on a liquid. At left are globules of water standing on waxed surface of a pane of glass. (Parallel lines across bottom of proto are edges of pane.) At right are water globules to which surface active agent (Tween-80) has been added, on the same surface. Note how water spreads out in thin film.



In comparison between the Stoenner plate test and the agglutination-lysis test, comparable results were achieved. Character of comparison was evidenced by slight variations, however, in screening certain titers.

The Stoenner Plate and Agglutination-Lysis Test

D. D. RUEDY, B.S., E. P. POPE, D.V.M.
R. E. HALL, D.V.M.

Animal Disease Diagnostic Laboratory
Wisconsin State Department of Agriculture
Madison, Wisconsin

COMPARATIVE TESTS were made by the Animal Disease Diagnostic Laboratory as a preliminary step before changing its leptospirosis testing procedure. At the start tests were limited to the number of sera which could be submitted from a single herd. It was hoped that the laboratory could use the Stoenner plate test[1,2,3] for screening and the agglutination-lysis test to determine titres. In this way restrictions on serum submission could be removed because less labor would be required and less expense involved. The comparative tests were started April 3, 1957, and completed on July 25, 1957.

A total of 848 sera were compared.

Procedure for Stoenner Plate Test

1. 0.005 ml. serum was pipetted on a glass plate with a standard "Bang's" pipette.
2. 0.03 ml. *Leptospira pomona* plate antigen (Fort Dodge) was added to the serum with a dropper.
3. Serum and antigen were mixed thoroughly with a clean toothpick. The plate was covered, and incubated at 22-24 C. for six minutes.

First reading: At the end of six minutes the glass plate was tilted and the serum-antigen mixture rotated slowly with a circular motion 15 times in 30 seconds. During this rotation if the serum was positive the agglutinated Leptospira gathered at the edge of the drop. If negative, the Leptospira remained evenly dispersed in the drop. Results were recorded.

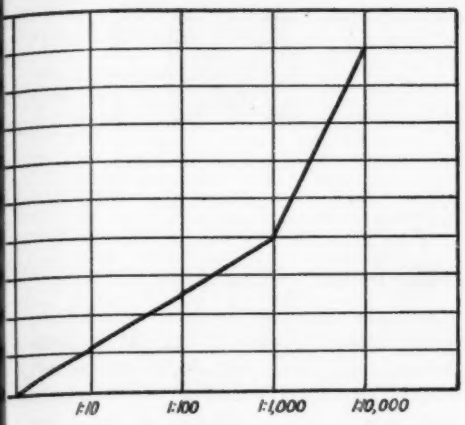
Second reading: The plate was rotated an additional 15 times in 30 seconds, read, and results recorded.

Procedure for Agglutination-Lysis Test

A modification of Reinhard's agglutination-lysis test[4] was used. The antigen used was a live *Leptospira pomona* (Johnson strain) prepared by the laboratory. Except for the following modifications, Reinhard's procedures were used in antigen preparation and testing.

1. Stock cultures were transferred at three week intervals.
2. Antigen cultures were transferred every two weeks.
3. Samples were incubated at 37 C. for two hours in a waterbath. Dilutions of 1:10,

CHART 1



Agglutination-lysis Titers

1:100, 1:1,000 and 1:10,000 were used in titre determination.

The comparison of agglutination-lysis results with the Stoenner plate results on 848 sera is shown in chart 1.

Experimental Herd

A herd of 33 bovines included in this report was found to be serologically positive in 1955. At that time clinical evidence of the disease was also present. Each year when sera are submitted for brucellosis recertification, these animals are retested for leptospirosis. The following table reveals agglutination-lysis results for 1955, 1956 and 1957. The table also presents the Stoenner test readings for 1957.

Serological evidence indicates that cattle may be positive to the agglutination-lysis test for three to four years following clinical evidence of the disease. It would appear that there may be a closer correlation between clinical infection and positive reaction with the Stoenner test.

TABLE 1. Agglutination-lysis and Stoenner Plate Tests

	Agglutination-Lysis Test			Stoenner Plate Test (1957)	
Titres	1955	1956	1957	No. Sera Negative	No. Sera Positive
Negative	0	9	12	12	0
1:10	1	2	5	5	0
1:100	2	12	6	1	5
1:1,000	9	6	7	1	6
1:10,000	19	3	3	0	3
Total	31	32	33	19	14

Test Results

1. Stoenner plate test detected 13% of the sera revealing titres in the 1:10 dilution on the agglutination-lysis test.
2. Stoenner plate test detected 15% of the sera revealing titres in the 1:100 dilution on the agglutination-lysis test.
3. Stoenner plate test detected approximately 40% of the sera revealing titres in the 1:1,000 dilution on the agglutination-lysis test.
4. Stoenner plate test detected approximately 90% of the sera revealing titres in the 1:10,000 dilution on the agglutination-lysis test.
5. Stoenner plate test agreed favorably with the agglutination-lysis test in regard to negative sera. Of 592 sera negative to the agglutination-lysis test, five were positive to the Stoenner plate test.

Summary

Although a limited number of sera were tested, results on non-bovine sera generally agreed with those obtained on bovine sera.

Data presented indicate that many sera with agglutination-lysis titres of 1:10 and 1:100 will be screened as negative by the Stoenner plate test. Positive Stoenner plate reactions compared favorably with agglutination-lysis titres of 1:1,000 and 1:10,000.

The number of leptospirosis diagnoses made in the future should not be materially altered, since leptospirosis diagnoses are based on agglutination-lysis titres of 1:1,000 or higher and clinical symptoms of the disease.

On August 1, 1957, the Wisconsin Animal Disease Diagnostic Laboratory initiated the Stoenner Plate Screening Test as part of its leptospirosis testing procedure.

Acknowledgment

The writers wish to acknowledge the assistance of S. H. McNutt, D.V.M., and D. T. Berman, D.V.M., Ph.D., Department of Veterinary Science, University of Wisconsin, Madison, in reviewing this article.

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Agricultural Trends

The year 1958 brought marked improvement in agriculture. Farmers' cash receipts from marketings are placed at about $33 billion, 11% above the year before and close to the 1951 peak. More important, farmers' realized net income is officially estimated about $13 billion — 20% over 1957. Per capita income of the farm population is currently running at the highest level on record. Responsible for the past year's gains are higher prices, increased marketings (including delayed marketings of some 1957 crops), and larger government payments, all of which have more than offset increased production costs.

The farm balance sheet presents a solid, highly solvent picture. Based on official estimates, farmers on January 1, 1959 will own real estate valued at $123.2 billion; livestock, crops, equipment, etc., of $58.1 billion; and cash and security investments of $18.7 billion, a grand total of $200. billion.

Against this, farm indebtedness is estimated at $22.6 billion, leaving a new equity of $177.4 billion, nearly $11 billion above a year earlier. Indebtedness amounts to slightly over 11% of total assets, which compares favorably with the 1940 figure of 19%.

The family farm — politicians and some agribusiness experts to the contrary — is still very much in evidence; 96% of all farms remain family operations, including big ones. As Dr. Theodore Schultz of the University of Chicago stated last December: "It is an error . . . to infer that the family-sized farm has not and cannot adapt itself to the new economic circumstances facing United States agriculture."

BAPN Causes Bleeding

A cause for the mysterious condition which causes turkeys to bleed to death internally may have been found by research workers at the University of Wisconsin. They report that a material in sweat pea seeds produces a condition very similar to symptoms of hemorrhagic disease frequently seen in commercial turkey flocks.

The material is called "beta aminpropionitrile," called BAPN for short. It was first isolated several years ago and was found to cause a bone disorder in rats.

In turkey poults, levels of approximately .12 of 1% caused death from internal bleeding within two weeks in two-thirds of the birds.

Resistance to Stomach Worms

Researchers at the University of Wisconsin report informatively on the influence of the loss of blood as an aid in developing resistance to future infestation with the stomach worm (*Hoernonchues contortus*) of sheep. A previous infestation with this parasite develops in sheep a degree of resistance to future infestation. Partial immunity is due, in a measure at least, to the loss of blood inflicted by the parasite. In controlled experiments with an artifically infested group, and a jugularly bled group, (the latter for the purpose of maintaining the same hemoglobin level as in the artifically infested group) it was determined that the control group had the usual high level of infestation, and the artifically infested group, and the bled group, both had a high degree of resistance to subsequent infestation as determined by fecal counts.

Special Report

MIDWEST VETERINARY NUTRITION CONFERENCE

Less than a decade ago, the "veterinary-nutrition controversy" was an old festering wound that flared up whenever feedmen or veterinarians had occasion to be concerned with each other. It constantly threatened to disrupt the vital services both professions render the meat food industry.

A few intrepid individuals sought to ameliorate the differences with proposals and compromises to heal the breach. But the undertow of emotional reaction had grown so strong that reason found it difficult to maintain a firm footing and keep from being swept away into a knock-down drag-out fight that would have availed either side nothing of value, or at best a Pyhrric victory, with the veterinary profession as well as the feed industry suffering a black eye before the public.

Last month those days seemed forever gone. Almost 300 registrants saw cooperation reach a high level during the First Midwest Veterinary Nutrition Conference in Kansas City, December 8-9, 1958, a meeting presented under the joint sponsorship of the State Veterinary Medical Association of Iowa, Kansas, Missouri and Nebraska in cooperation with the Midwest Feed Manufacturers' Association. Sessions that lasted two days covered the latest developments in feeding poultry, swine, ruminants, and pet animals, as well as nutritional problems associated with all feeding programs. But the undertones of the meeting paid tribute to a far greater story, the up-hill fight that has replaced antagonism with teamwork.

The late Dr. Robert L. Anderes, then editor of VETERINARY MEDICINE, and chairman of the program committee of the Kansas City Veterinary Medical Association, along with associates such as Dr. A. H. Quin, is generally credited with bringing the veterinary-nutrition controversy into proper focus. He correctly sensed the exciting progress being made in animal nutrition. He argued the importance of prevention of disease through sound nutrition

Dr. Morris Erdheim, Dawe's Laboratories, is shown here receiving a parchment from Lloyd S. Larson, executive vice president of Midwest Feed Manufacturers' Association "in appreciation for his efforts in developing a veterinary-feed relations program."

in the pages of the journal he edited, and pointed to the veterinarian in the field as the key figure in that picture. As a preliminary step toward better understanding between the two groups, the program committee of the Kansas City Veterinary Medical Association invited Dr. Morris Erdheim, a veterinarian who happened also to be qualified as a nutrition expert and a feedman, to lay the cards on the table at a local meeting. The ready interest unveiled at the Kansas City meeting prompted other ventures into the area of concilliation.

The University of Nebraska in 1954 and 1955 sponsored nutrition conferences for the feed industry and the veterinary profession, with veterinarians and feedmen attending separate sessions. But the broad scope of subjects covered by various speakers pointed to the interchange of ideas as a necessity, and alerted veterinarians to the valuable contribution of nutritional information to the practicing veterinarian. Through such meetings, and through increased interest in animal nutrition in the professional literature, a clarification of the role of the feedman as a feed supplier and the veterinarian as an expert in health problems was achieved. By placing each group's activity in proper perspective, the feedmen were discouraged from attempts to diagnose and treat diseased animals and birds.

Later a step was taken that has since proved to be the foundation stone for a new era of cooperation and mutual understanding between the feed manufacturing industry and the veterinary medical profession. In Nebraska feedmen and veterinarians formed a joint permanent committee to draw up long-term objectives and promote a closer working relationship between the two groups. In the meantime, at the San Antonio meeting of the A.V.M.A., a new organization of veterinarians was formed: The American Association of Veterinary Nutritionists.

Midwest Conference

The Midwest Conference itself grew out of efforts between prominent representatives of feedmen and the veterinary profession. Dr. Morris Erdheim, of Dawe's Laboratories, and Mr. Lloyd Larson, of the Midwest Feed Manufacturers' Association were both prominent figures at the meeting. Doctor Erdheim was given recognition for pioneering veterinary interest in both the area of nutrition and veterinarian-feedman relations. He was presented a certificate of commendation during a dinner meeting at which Dr. Russell E. Rebrassier, president of the A.V.M.A., was speaker.

A.V.M.A. Spokesman

"Veterinary medical practice requires the veterinarian to diagnose and treat disease," Doctor Rebrassier said. "He has an obligation to use his clinical know-how and available laboratory facilities to get an accurate diagnosis and to institute appropriate treatment to restore health in sick animals . . .

"The feedman's job . . . is to provide the livestock owner with a feed product and feeding program designed to yield the greatest economical gain.

"Each group has a definite role in fighting livestock diseases. The veterinarian develops and participates in programs designed to control diseases, and the feedman assists in the maintenance of health through sound nutrition. While these roles are distinct, the concern of both groups for animal health has led to encroachment and overlapping. This is an area where conflict between the feed industry and the profession can arise."

Doctor Rebrassier went on to say: "Joint committees, composed of representatives from the feed industry and the veterinary profession, need to be formed at community and state levels. These committees can serve to adjust grievances, air possible causes of conflict and act to avoid these causes, and adapt knowledge of local conditions. They can help plan programs for joint meetings.

"These activities should, and must, be encouraged. The benefits of cooperation so far outweigh the causes of conflict, that these causes must be adjusted. Either group can stand without the other, but progress demands we stand together."

The tempo of the meeting was well sounded by Doctor Rebrassier in the matchless sentences of his address. How it fulfilled the promise of expectations is evident in the abstracts of reports that follow.

NUTRITIONAL DISEASES AND MINERALS FOR SWINE

Notes from a report by Dr. Merle Brinegar, *Assistant Director of Research, Allied Mills, Inc., Libertyville, Illinois.*

The greater intensification of swine raising has brought about a re-evaluation of some old mineral nutrition practices. With the movement of more hogs to a nearly complete lifetime cycle of a concrete-floored environment, nutrient protection once afforded by the soil is gone. The trend towards larger litters, changing economic patterns of farming—all alter the mineral picture. In response to these changes, considerable research has been conducted at college experiment stations, particularly with magnesium, manganese, molybdenum and selenium. Controlled experiments have established metabolic relationships of mineral elements with every other element.

One of the greatest misuses of minerals is the haphazard addition of extra mineral mixtures or supplements to an already balanced ration. Imbalances can be created.

Products are occasionally used which may be of psychological value only to the swine raiser. The balance of the mineral element is often as important as the amounts. Too much can be as harmful as slight deficiencies.

BALANCING SWINE RATIONS

Notes from a report by Dr. D. E. Becker, *Department of Animal Science, University of Illinois, Urbana, Illinois.*

In general, balancing the nutrient content of swine rations is largely a matter of correcting the deficiencies of the cereal grains which serve as the primary source of energy. Probably no class of nutrients is more important and critical in swine rations than proteins or their components, amino acids. Protein is needed in the diet of all classes of swine in order to supply amino acids for the physiological processes such as maintenance, growth, reproduction and lactation.

Since no body storehouse of amino acids can be drawn upon to enhance the utilization of poor quality proteins, amino acids must be present in the diet at the time of protein intake. Evidence indicates that swine producers should feed supplementary proteins daily rather than after irregular or prolonged intervals.

NEW CONCEPTS OF SWINE PRODUCTION

Notes from a report by Dr. Robert Nesheim, *Swine Nutrition Department, The Quaker Oats Company, Chicago, Illinois.*

During the past several years many new ideas have been presented for consideration by pork producers. Confinement rearing as opposed to pasture feeding is increasing; multiple farrowing is becoming a common practice; the use of feeder pigs is receiving increasing interest; early weaning is getting established on a sounder basis; and mixed rations, including pelleting, are beginning to show growth and potential for the future.

Factors contributing toward an interest in confinement rearing are as follows: (1) Nutritional knowledge has enabled nutritionists to formulate rations that are not improved by pasture; (2) increased land values and reduced feed saving advantages are resulting in low return per acre of pasture used for hogs; (3) multiple farrowing is changing requirements for production facilities; (4) advances in sanitation procedures, plus improved disease and parasite control methods, are making centralized facilities practical; and (5) greater convenience in performing labor is effected.

Multiple farrowing makes more efficient use of facilities and labor and provides for multiple marketing. As a result it aids the packing industry by spreading the supply and reducing storage requirements.

Use of feeder pigs presents several problems to the pork producers, chiefly in finding a consistent supply of uniform, healthy pigs at prices equitable to both the feeder and the producer. Feeder pig producers can improve their status considerably by providing thrifty feeder pigs that have been castrated by two weeks of age, vaccinated, weaned and on feed before being sold as feeders.

The practical economy of feeding complete pelleted rations to growing finishing hogs depends upon local comparisons. Many hog producers find that feed saving feature plus increased rates of gain and reduced labor require for feeding makes the use of complete pelleted rations practical and economical.

GROWTH STIMULANTS FOR SWINE

Notes from a report by Dr. J. L. Krider, *Central Soya Company, Inc., McMillen Feed Mills, Fort Wayne, Indiana.*

Non-nutrient growth stimulants, such as antibiotics, chemobiotics, and arsenicals added to rations have significantly reduced the costs of producing pork. Certain antibiotics and chemobiotics have a variable—but generally marked—influence on the growth of pigs, particularly during the early growing period. They generally promote growth when added to rations otherwise complete through their direct effect on the intestinal microorganisms. Only by experimentation can the optimum level of each feed supplement be determined; otherwise recommendations of manufacturer can be followed, since these are generally based on research.

Arsenicals have been used to promote growth either singly or in combination with feeds already containing antibiotics. They have also been used for parasite and disease control. Since arsenic compounds are toxic when used in excess, care must be exercised in mixing feeds containing these products. A veterinarian who is diagnosing sickness in pigs being fed a commercial feed should carefully check with the swine producer to determine whether the feed contains an arsenic compound before prescribing medication which includes an arsenical.

Wormer compounds are used in commercial feeds to a limited extent. When used to remove intestinal parasites, growth may be an indirect result. Wormer compounds are not growth stimulants *per se.*

Basic disease problems are not generally responsive to growth stimulants.

Veterinary evaluation of the problem is essential if the various aspects of the situation are to be kept in check.

COMPATABILITY OF WATER MEDICATION WITH FEED MEDICATION

Notes from a report by Dr. Reed R. Rumsey, *Dr. Salsbury's Laboratories, Charles City, Iowa.*

The incompatabilities of the many different drugs on the market today are almost impossible to define. Toxicity must be prevented by intelligent use of these drugs under field conditions. Those warnings that appear on the label should be followed and the quantity and length of treatment should be closely watched. Consideration must be given any drug contained in the feed before proceeding with a water medication. For instance, arsenicals can be overdosed. Sulfa drugs must be limited to poultry.

In preventing these problems, more sensible use of diagnostic laboratories must be made. Better education in poultry disease prevention and treatment must be made available in veterinary colleges.

Medicinals are only an aid in the prevention of a particular disease. They have their limitations, compatability and disease spectrum. They should be used as intended and factors that greatly influence medicinal response such as general management, bird quality, nutritional level, geographical factors and disease concentration.

DEVELOPING A POULTRY PRACTICE

Notes from a report by Dr. C. L. Nelson, *Jewell, Iowa.*

If the poultry industry is going to receive the same competent veterinary service other phases of the livestock industry enjoy, cooperation will have to be forthcoming from all those interested. At present the poultry industry is suffering from quackery, high pressure salesmanship, mis-diagnosis and a genuine lack of veterinary interest in the problems of the poultryman. The absence of the veterinarian has allowed a vacuum to develop.

The vacuum has been filled largely by promiscuous medication and mis-diagnosis costing poultrymen millions of dollars. High-pressure salesmen are pumping drugs and biologicals into the industry equal to the

total combined drug and biological consumption of the swine and cattle industry.

The interest of the feed industry is at once apparent. Many concerns have direct financial interests in poultry enterprises, and therefore the health of birds is a factor affecting the security of the investment. Unfortunately some feed companies work hand in glove with undesirable elements that now exist in the poultry industry.

A program to direct competent veterinary service to the poultry industry should appeal to all who are an integral part of the poultry business.

Veterinarians can take the following steps to achieve a poultry practice.

1. Equip offices with laboratory equipment to aid in the diagnosis of poultry diseases. Laboratory procedures are exacting and eliminate the guess work in diagnosis of many poultry diseases.

2. Become acquainted with the feed representative in the area and let him know of an interest in poultry work.

3. Familiarize yourself with management problems of poultry husbandry. Poor management is a contributing factor to a large percentage of poultry diseases.

4. Learn the nutritional requirements of poultry and become familiar with the feeding program of the feed companies in your area.

5. Never condemn a feed as the cause of a poultry ailment, or make a diagnosis of a deficiency disease without having a preponderance of evidence, and then first notify the feed representative. Deficiency diseases of poultry on a recommended feeding program are rare.

6. Charge a fee for your diagnosis and do not perform autopsies free with the hope of making it up on medicable cases.

7. Do not resent periodic calls by feed representatives to flocks that they have under feed contract. This is the only way that they can learn of the progress of the flock and make sure that the owner is following the recommended feeding program.

8. Do not medicate flocks unless there is a specific reason for doing so.

9. Do not let flock owners in your area medicate their birds promiscuously.

10. Contact the feed representative before recommending the addition of medicaments to feeds. In large flocks requiring five to ten tons, this can be done more easily and economically at the home plant.

COMBATTING STRESS PROBLEMS IN THE FEED LOT

Notes from a report by Dr. John B. Herrick, *Department of Veterinary Medicine, Iowa State College, Ames, Iowa.*

There are many problems confronting a feeder in getting a group of cattle into a feedlot and to market. Intensive changes of management, nutritive levels and disease hazards usually accompany these changes. These changes, particularly if they are adverse in any form, are called *stress.* The word stress has been attended by the sale of various products, thus lulling feeders into thinking that adverse factors are packaged together and can be overcome together.

It appears that the following facts briefly summarized, are needed to be employed to avoid stress on cattle coming into the feedlot.

1. Cattle that move from sale barn to sale barn not only are exposed to various diseases, but have suffered considerable stress from lack of water, feed and rest. Therefore an attempt should be made to avoid "yard weary" cattle. Direct from range or commission yard to the feedlot is the best preventive of shipping fever complex.

2. Tranquilization of feeder animals seemingly prevents shrink. The drug also enables cattle to be placed on full feed in a shorter time than non-tranquilized cattle.

3. Shipping fever is apparently triggered by a virus and accentuated by bacteria. Respiratory infections should be attended to immediately before weight loss is suffered.

4. Fortified rations for nutrient deficient cattle are important if the normal ruminal flora can handle such concentrated rations. Prairie hay and a handful of oats do not readily restore shrink and have the animal gaining. On the other hand, alfalfa hay and corn self fed the first day will result in a sick animal.

5. Keep animals comfortable. Handling to give all the necessary injections is sometimes more detrimental than any illness that might occur.

WORKING WITH VETERINARIANS

Notes from a report by Dr. W. E. Poley, *Director of Nutrition, Zip Feed Mills, Inc., Sioux Falls, South Dakota.*

Farmers sometimes interpret a veterinarian's remarks as an indictment of the feed being used. Continuing reports of this nature prompted Zip Feed Mills to set up a policy designed to preclude these costly misunderstandings.

Briefly, whenever a feeder experiences problems of either poor feeding results or sick animals, the dealer is asked to suggest to the feeder that a local veterinarian be consulted for diagnosis. Either a dealer or salesman is present when the veterinarian makes his call. The company then picks up the check for cost of the call and diagnosis, but not for medication, vaccination or treatment. Needless to say, the veterinarian is expected to say honestly whether the feed is implicated or not. At the same time, a by-product of this technic is the tendency of the veterinarian to stress definitely when the feed is not to blame.

Numerous case reports indicate that the system is profitable first of all to the feeder, and also to the veterinarian and the feedman. As a public relations tool it is unexcelled.

WORKING WITH FEED PEOPLE

Notes from a report by Dr. John Aiken, *South Sioux City, Nebraska.*

Feed manufacturing is a highly technical industry and veterinarians are a part of a scientific profession. Comprehension of this simple fact can resolve the basic problem now characterized by lack of understanding, appreciation and cooperation between veterinarians and feedmen.

Both feedmen and veterinarians have an identical goal: helping the animal husbandryman and poultryman raise livestock more efficiently. Veterinarians are primarily interested in maintaining healthy livestock which is almost impossible under conditions of poor nutrition. Feedmen are interested in formulating the best possible feed for efficient production of livestock, which is also impossible under conditions of poor health.

Understanding can best be achieved by wiping away the chief complaints of both groups. Veterinarians can be calculated to accord full cooperation when feedmen refrain from making diagnoses and effecting treatment without veterinary consultation. At the same time it must be understood that most veterinarians will equip themselves to deal with domesticated animals of economic importance if they are made to feel the service is needed.

A talk over a cup of coffee with the local practitioner should be made a required part of a feed salesman's routine It is necessary for the salesmen to make the first move. There are usually several feedmen in one locality and it is difficult for the veterinarian to know which are interested in working with him.

On the other hand, veterinarians cannot be expected to make the rounds of feed mills to feel out the situation. The feedman must take the first step.

Frozen Semen Storage

It has become possible to increase the service life of outstanding bulls by at least two years, since frozen semen from these sires can be used to produce calves artificially nearly two years after the sire has died or been removed from service.

Scientists at Rutgers University report that semen may be stored for at least two years at —110 F. without causing an appreciable decline in the fertilizing capacity of that semen. In New Jersey the frozen semen from five bulls was used to breed 102 first services. The fertility rate of the semen used fresh and after storage from 7 to 14 days, 6 months, 1 year, and 2 years, was 78.0, 66.7, 70.1, and 65.7% respectively.

HISTORICAL REVIEW . . .

The CRIMINAL PROSECUTION and CAPITAL PUNISHMENT of ANIMALS

A. BARTON, D.V.M.

Forest Hills, New York

IN NEW YORK CITY, on Sept. 18, 1956, *The New York Times* carried a news item stating that a 45-year-old man was charged with the violation of the Sullivan Law because of his possession of a huge German Shepherd dog that allegedly attacked three patrolmen. This was the first time in the memory of the Felony Court staff that a dog had been called a weapon. The Sullivan Law usually is invoked against persons who use pistols or knives to inflict harm or injury. While the legal interpretation of this incident created a furor of mixed derision and amusement, the fact remains that it reflects a legal tradition in western civilization of well over a thousand years. This tradition is based on biblical theology and has its roots in ancient Grecian and Persian religion and mythology, with roots, in turn, extending to immemorial antiquity.

Animals on Trial

Absurd as it may seem, there was a time, especially in the medieval era, when animals were criminally prosecuted and capitally punished before the law—not with any attitude of light-hearted facetiousness, but with all the stern and formal dignity of any other case before the bar of justice. A pig accused of infanticide, for instance, would be handled with the fanfare of a notorious highwayman. There would be all the legalistic trappings of berobed and bewigged judges, defense and prosecuting attorneys; the questioning and cross-examining of witnesses; the presentation of evidence; all the legal chicanery of attempts to delay the case or confuse the issues; fervent, florid and learned orations and summations. If the pig was found guilty and condemned to death, a scaffold would be erected in the public square; the town crier would announce the event to the townsfolk; priests and officials would attend especially dressed for the auspicious occasion; sometimes the pig itself would be dressed in costume; and then to the blaring of bugles and the tolling of church bells, the pig would be hung by the neck until dead, and its body cast ignominiously to the dogs.

Cases recorded from the ninth to the 20th centuries involve all the common domesticated species, except the cat, and also a wide variety of other animals and insects ranging from vermin to locusts. Domestic animals were tried by secular courts like any other member of the household. Animal offenders that could not practicably be presented in court were tried by ecclesiastical courts because supernatural means had to be invoked for their punishment. The latest case, mentioned by E. P. Evans, in his delightful work, *The Criminal Prosecution and Capital Punishment of Animals,* concerns a murder in Switzerland in 1906, of a man by two men with the aid of their dog. The three murderers were tried, and the two men sentenced to life imprisonment, but the dog, as the chief culprit, without whose complicity the crime could not have been committed, was condemned to death.

Amusing Aspects

Some cases have their amusing aspects. In 1474, the magistrate of Bäle sentenced a cock to be burned at the stake "for the heinous and unnatural crime of laying an egg." In Vanvres, France, in 1750, there was the case of Jacques Ferron, who was taken in the act of coition with a she-ass, and after due process of law, sentenced to death. But the animal "was acquitted on the ground that she was the victim of violence and had not participated in her master's crime of her own free will. The prior of the convent, who also performed the duty of parish priest, and the principal inhabitants of the commune of Vanvres signed a certificate stating that they had known the said she-ass for four years, and that she had always shown herself to be virtuous and well-behaved both at home and abroad and had never given occasion of scandal to any one, and that therefore 'they are willing to bear witness that she is in word and deed and in all her habits of life a most honest creature.' This document, given at Vanvres on Sept. 19, 1750, and signed by 'Pintuel Prieur Curé' and the other attestors, was produced during the trial and exerted a decisive influence upon the judgment of the court. As a piece of exculpatory evidence it may be regarded as unique in the annals of criminal prosecutions."

The ancient Greeks held that a murder,

Continued on page 80

Practitioner's Laboratory

W. L. SIPPEL, V.M.D., Ph.D.

Florida Livestock Board
Kissimmee, Florida

Differential Diagnosis

The differential diagnosis of actinomycosis, actinobacillosis and botryomycosis is often desirable to aid in prognosis and treatment. While these diseases affect cattle and swine most frequently, actinomycosis also occurs in dogs,[1] turkeys and other animals. This fungus is apparently ubiquitous. Differentiation is based on the Gram's stain.

"Sulfur granules" or small concrements containing the causative organisms are present in the pus in the above conditions (rarely in others). These objects should be recovered and examined microscopically under reduced light. A series of radiating club-like structures will be seen. Smith[2] indicates that it is necessary to demonstrate these rosettes before actinomycosis or actinobacillosis can be diagnosed. Hagen[3] suggests facilitating finding of the granules by placing the pus in broth or saline and shaking the tube to dissolve the mucin holding the pus together. When poured into a flat dish, the granules are readily visible. The clubs of non-actinomycotic pus are said to be smaller than those in the fungus infection.

When a Gram's stain* is applied to smears of the pus in actinomycosis infections, one will observe pleomorphic Gram's positive elements. These may be short rods, long rods or filamentous and branching. Actinobacillosis results from a small Gram's negative rod which may be difficult to see against the background of red-staining debris. Botryomycosis is caused by staphylococci (micrococci) which have typical coccus morphology in "grape cluster' grouping. This is the cause of most so-called "actinomycosis" of the udder of sows.

When obtaining the sample of pus for examination, care should be taken to prevent contamination of the premises.

If confirmation of the diagnosis is desired, biopsy specimens or pus for staining and culture can be forwarded to a diagnostic laboratory. However, the above simple office procedure is adequate for positive clinical diagnosis.

*Solutions available from veterinary supply houses.

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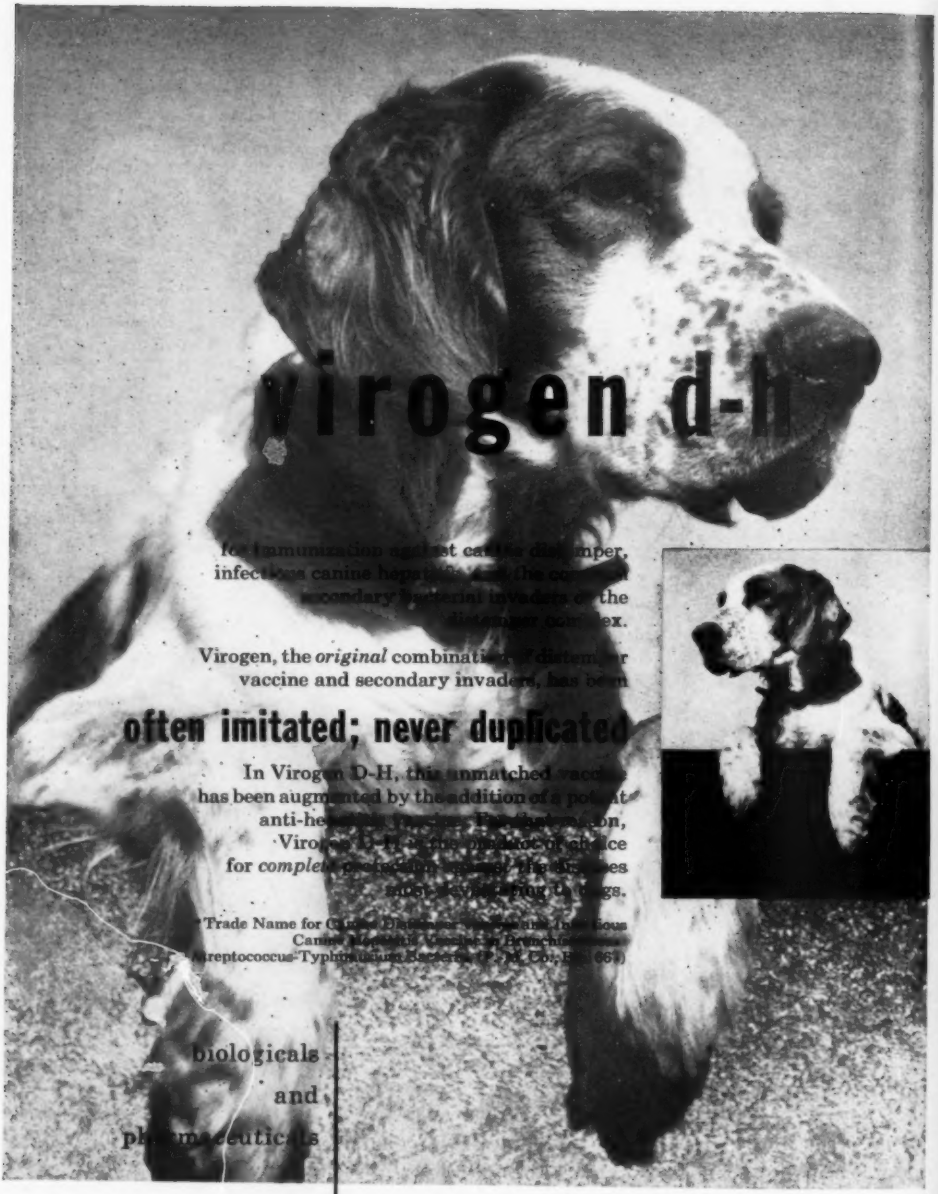
CRIMINAL PROSECUTION

Continued from page 79

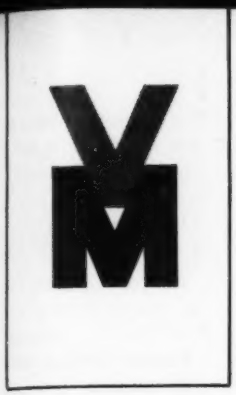
whether committed by a man, a beast, or an inanimate object, unless properly expiated, would arouse the furies and bring pestilence upon the land; members of the medieval church sometimes taught the same doctrine, and only substituted the demons of a paganized Christian theology for the furies of classical mythology. The ancient Persians divided all creations, including animals, into good and evil ones. Homicidal animals were infused with evil and were to be constantly combatted and finally suppressed. The medieval basis for the judicial prosecution of animals is specifically derived from barbaric customs as well as the Mosaic law recorded in Exodus, xxii, 19 and Leviticus, xx, 13-16, which states, among other things, that a homicidal ox must be stoned. This was amplified by considering homicidal animals as being possessed by the devil, thus giving further justification for animal prosecution. The interpretation of "Thou shalt not suffer a witch to live" led to the horrors of the Salem witch trials, marking one of the blackest periods in American history.

With the advent of modern times with its more stringent and rational laws regarding motive and proof of crime, old ideas and prejudices are gradually dissolving. But while the old order passes, its evil as well as its good somehow survive.

SMALL ANIMAL PRACTICE



PITMAN-MOORE COMPANY DIVISION



The care of aged pets is becoming a growing consideration in small animal practice. The writer discusses not only physiological aging with attention to compensation rather than cure, but also pathological aging and therapy that can cure or serve as prophylactic measures.

Geriatrics of Small Animals

F. D. GENTRY, B.S., D.V.M.

Springfield, Missouri

GERIATRICS is defined as the branch of medicine which deals with diseases of old age. This is indeed a broad field since most diseases of old age result after many years of disease and abnormal function of the body.

The alert veterinarian tries to keep abreast with medical science in taking measures to alleviate distress due to pathological and physiological change—the aging process. Daily the veterinarian is confronted with problems of the aged pet and its ever extending life expectancy. Every pet owner wants to keep his pet well and happy for a long time, but he does not want an old broken down dog, and so it becomes a professional responsibility to remedy and compensate for changes brought on by old age.

The animal body is never so perfectly constituted that, like the deacon's "One Hoss Shay," it all collapses at the same time. It would be wonderful indeed if the body could function normally for a complete life span, but this is not in the realm of reality. The normal process calls for suffering as first one and then another of the organs and members of the body fail to function properly.

Veterinarians must remember the deep sentiment that a client has for an aging pet. Many of our records on pets 12 to 15 years of age reveal that the pet has literally grown up with the children. Teenagers can not remember when Old Shep was not a member of the family. The family circle is broken when the old pet dies.

The Pet's Age

We are not able, at present, to explain the actual mechanism which enables animal time-clocks to operate. Cells and tissues of the canine and human species are fundamentally identical. Why, then, does the dog live only a decade — two decades at the most — and the human being five to seven times longer?

We do not have the answer to why some breeds live longer than others. Many Boston Terriers live 15 to 17 years, whereas few English Bulldogs live to be ten. Some pets are old at seven to eight years of age; others are not old at 13 to 14 years. I have patients six to eight years of age that have practically no teeth, and I have 14 year old dogs with perfect teeth. One of the amusing things in my practice is the owner's

tendency to stretch the dog's age.

Sometimes pet owners will tell me the dog is now 14 years old, or maybe 17, and yet hospital records reveal the dog to be only nine or ten. This points up the need for keeping accurate records. When I first started to practice, I asked the age of the dog for my record. Now I always ask for the birth date of the pet. Often I hear such statements as, "We got her for Mary's fourth birthday." Since Mary is 12 now, that would mean the dog was a puppy eight years ago. If I had asked the dog's age the answer in all probability would have ranged from 5 to 15 years.

Premature Aging

Premature aging presents a real problem. When a seven year old Cocker is presented and the face is beginning to turn grey, and the dog appears to be much older than seven, I question whether the problem is of pathological or physiological origin.

For example, a female Cocker Spaniel whelped October 1947 and appeared to be normal until September 1953. At that time she went through false pregnancy or pseudocyesis. This condition was treated with hormones, with apparent success. However, this was followed by cystic ovaries and in March 1954 I decided to do an oophorohysterectomy since signs of excessive estrogenic activity were evident along with the accompanying skin change. Recovery was uneventful except that the skin failed to return to normal. This condition remained refractory to treatment until May 1957.

We started Vigojex (Pitman-Moore) male and female hormone therapy at three week intervals. This resulted in marked improvement in the dog's general health along with a spectacular improvement in hair coat. The skin returned to near normal. Four years after the onset of premature aging, the bitch appears to be in good health. She is now 11 years of age. It seems that once the animal has returned to normal, hormone injections can often be discontinued, or at least the intervals between injections can be extended.

It has been my observation that one or more false pregnancies is a good indication for an oophorohysterectomy. Once pyometra appears, it is a waste of time not to recommend surgery. This condition never returns to normal and the animal is rendered incapable of breeding again. Removal of the ovaries and uterus allows a good chance for a normal life. Delay invites other complications and a good chance of having a dead pet.

Canine Kidney Disfunction

Often we are presented with an old dog suffering from stiffness or rheumatism and loss of weight. Examination of the urine normally reveals considerable kidney disfunction. Kidney disfunction can imitate many other conditions, and therefore it is imperative that a urinalysis, and possibly a blood urea nitrogen determination be made. Doctor Berrier, in his book, Diagnostic Aids in Veterinary Medicine, has presented the technics for urinalysis and B.U.N. determination so simply that any veterinarian can conduct these tests with little effort and a minimum of equipment.

An eight year-old Cocker Spaniel was extremely stiff and unable to get around. Urinalysis and B.U.N. could indicate that this dog would never recover. As a result of abnormal kidney function with retention of blood urea nitrogen, this dog went from extreme stiffness to high fever, extreme vomiting, dehydration and eventually, into necrotic stomatitis before returning to near normal. Treatment involved the use of parenteral fluids, Bonamine (Pfizer); liver extract; B complex vitamins; antibiotics; K.D. (Hill's); and Urised (Chicago Pharmacal) as an urinary antiseptic. The recovery period took 16 days. The dog made a good comeback while being maintained on K.D. dog food.

Without early recognition of the condition the dog would have been lost. It has been stated that when a B.U.N. is above 100 mg. per 100 ml. of blood, there is no chance of recovery. The dog I have just discussed maintained a B.U.N. above 100 mg. for quite some time, yet recovered. This points out a significant fact. Laboratory tests are useful as tools but are not to be depended on entirely. Old dogs do not follow all of the rules in so far as laboratory findings are concerned.

Uroliths

Uroliths constitute a problem in the older dogs. These are often easy to diagnose. Every old dog should be checked for the presence of calculi. Calculi in the male is easy to diagnose since it's impossible for the animal to void urine. Any time a female dog strains at time of urination, or wants to urinate more often than normal, a wise procedure is to check for calculi. Most clients complain that their Little Cindy needs to go to the bathroom too often and when she has an accident "it stinks us out of the house," and "last night we saw some blood in her urine."

In examining these patients, one must try to distinguish calculi from urinary incontinence resulting from low estrogens. I never ask if the bitch has been spayed. If I do not know, I ask, "When was she in heat last?" They will usually tell you, or answer, "Oh, Doctor, she was spayed six years ago. She has never had any puppies." Most bitches with calculi can be palpated rather easily. If in doubt and an *x*-ray is not available, gently pass a canine metal catheter, and while the catheter is in the bladder, it can be used as a sound. This procedure also permits collection of a urine specimen for examination later. Calculi may be one large urolith, or several fairly large stones, or small gravel or sand. In any case, surgical removal of this material is indicated.

In the case of incontinency of urine in the oophoroectomized animal, 1 mg. Stilbestrol orally for five to six days is preferred therapy, with 1 mg. administered each week thereafter, or to effect. Only a small oral dose of Stilbestrol is required to control uncomplicated urinary incontinency resulting from low estrogen in an oophoroectomized bitch.

Mammary Tumors

Although mammary tumors affect all breeds of dogs, a higher incidence is observed in hunting breeds. When operable, surgical removal of these tumors is indicated. Radical mastectomy with removal of all glandular tissue in the particular lymphatic drainage area, along with the adjacent lymph node, is necessary. To remove only the tumor in any of the posterior three mammary glands on one side invites trouble. A radical mastectomy usually results in complete success. In many cases, involved tissues are classified as malignant. However, following radical mastectomy we have had little metastasis to other organs.

Since mammary tumors are exceedingly rare in oophorectomized animals, I present this as an advantage when asked about spaying a female. I can not agree that oophorectomy has any value after mammary tumors have become apparent; therefore, I do not routinely do oophorectomies at the time of a radical mastectomy.

Tumors of the Testis

In older male dogs, there are two conditions that give us considerable trouble, namely, tumors of the testis and enlarged prostates. Removal of the tumorous testicle, leaving the normal testicle intact, is to be recommended in aged dogs. Removal of the involved testicle in an old dog often brings such remarks as, "Doctor, my dog is now just like a pup." I am informed that in man, metastasis is the rule, and that the prognosis in cases of testicular tumors is bad. However, I find when removal is early, metastasis is rare in the dog and prognosis is excellent.

Prostatic Enlargement

I have never been satisfied with my results in treating older dogs for prostatic enlargement. Castration is quite effective in the treatment of enlarged prostates, but owners do not like to have this surgery performed. The use of estrogens often helps. But this practice can not be continued indefinitely, since it will produce feminization similar to Sertoli's cell tumor of the testes. When I find an enlarged prostate in an old dog I do not attempt any radical procedures unless symptoms of distress are evident, such as constipation, perineal hernia or urinary stenosis. Enlarged prostates are probably physiological in dogs over six or seven years of age.

Lymphoma

In most cases of lymphoma, bilateral enlargements of the lymph glands through-

out the body are noted. If you check the blood picture for an extremely high W.B.C., such as is common in man with leukemia, you will be disappointed since with most lymphomas, the blood picture will remain near normal both in total count and differential. I have encountered only a few cases in which the nodes in only one area were involved. So far as treatment is concerned, we have resorted to the use of Meticorten (Schering) in producing palliative effects in the bilateral cases and surgery for solitary nodes. I have never used *x*-ray or nitrogen mustard, but understand these two agents are only palliative and eventually the patient will succumb or will need to be euthanized.

Spleenic Tumors

Provided metastasis has not occurred, spleenic tumors, can be controlled by spleenectomy. These can often be palpated, or discovered with exploratory surgery. In most cases, the omentum is greatly vascularized and adherent to the tumorous spleen. This necessitates numerous ligatures following surgical removal.

Cardiac Insufficiency

Perhaps the most universal problem of the aging pet is that of cardiac insufficiency due to valvular leakage. Often these cases are easy to diagnose. Some cases are so spectacular that valvular leakage can be felt by placing the hands on the dog's chest; other cases require the use of the stethescope, while others are not apparent when the dog is excited.

Cardiac disturbances are often masked during periods of excitement.

I make a practice of going out to the car to examine some patients in which I am suspicious of cardiac disturbances, rather than risk the excitement which might be produced by bringing the dog into the office. Another technic I find quite useful in making an examination of the heart is to place pressure upon the eyeballs. This slows the heartbeat and allows a better chance to properly evaluate heart action. The heart has a tremendous ability to adjust and compensate for its deficiencies, and in most cases, this compensation has been taking place over a long period of time. It is surprising how long cardiac patients can be kept asymptomatic under adequate medication, and with little other help.

The most common symptom owners report is: "Doctor, my dog coughs all the time but it is much worse when he becomes excited." Occasionally, clients note that the dog "passes out" but when rubbed or massaged "comes right out of it."

I routinely place these dogs on a digitalis preparation (Zem-Cardi — Zemmer Company), which contains strychnine, making the dose fairly light to start with, and increasing the dose later to the desired point. I often resort to the use of Nebuphene (Jen-Sal), or Anexia-D (Massengill) for the relief of the cough. Vitamins are used, and if the dog is over weight gradual reduction is attained by cutting down on the diet, or resorting to the use of R.D. (Hill) dog food.

Many older dogs have been on digitalis for a period of three or four years.

Dental Care for Small Animals

Nearly 100% of our old dogs need dental attention. This may only necessitate removal of tartar. However, if tartar has not been routinely removed, a high percentage of dogs will have loose teeth, which in most cases can be removed with little pain. If the condition of the teeth is too bad, I place the dog under a short acting anesthetic such as Kemithol (Ft. Dodge) and do all necessary work at one time. If, for any reason, an older dog is under anesthesia, routine check of teeth and cleaning can be accomplished with little added effort.

Circumanal Tumors

Anal tumors are often found in older male dogs. These are usually found as small nodules around the anus. Surgical removal is indicated only if a small area is involved. If the entire area is involved, E.C.P. (Upjohn), repeated at three week intervals is of real value in reducing the size of these tumors. Often, after one or two doses of 1 mg., ugly, bleeding areas will atrophy and heal, leaving the dog asymptomatic.

Reduction of X-Ray Exposure Time

S. GLASOFER, D.V.M.

Newport News, Virginia

A REDUCTION of the amount of exposure time used in preparing roentgenograms affords two vital advantages to the radiographer. These consist of (1) clearer and sharper *x*-ray plates, and (2) the reduction of radiation hazard to the practitioner or technician using the apparatus.

Exposure

Clearer and sharper roentgenograms can be more readily achieved by reducing or eliminating motion of the subject (including motions of normal respiratory activity) and also by decreasing the incidence of scattered *x*-rays.

Elimination of the patient's movements are best achieved by complete anaesthesia and/or restraint devices, however if the patient's movements are stopped by a shorter exposure time, these measures can often be eliminated. One advantage to the busy practitioner is the possibility of *x*-raying the patient and rendering a diagnosis while the owner is waiting.

The second advantage cited for a reduction in exposure time is perhaps the more important of the two mentioned. According to Schnelle,[1] the radiographer is exposed continually to doses of scattered *x*-rays which are cumulative in their biological effect. Armstrong[2] presented evidence that radiation damage has as its basis a chemical lesion produced by radiation doses lower than those causing anatomic damage.

Reduction of radiation hazard through the use of simple and often inexpensive devices can result in a considerable improvement of the radiographer's safety.[3] With the use of faster *x*-ray film (*e.g.* Kodak's Royal Blue or DuPont's X-Tra Fast), faster screens and improved developers, the dose of *x*-ray exposure can be reduced by 50 to 75%.

PLATE A.

PLATE B.

A New Developer

PRA is a new high energy fine-grain developer which has none of the drawbacks of other fast acting solutions that achieve speed at the expense of quality.[4] Comparison with standard solutions show it to have a finer-grain formula with similar density range.[5] The effect of the compound is equivalent to working with film which is more sensitive to light, thus allowing for developing with no loss of detail.[6] This formula is the development of Bernard Hoffman of New York, New York.

As PRA is a mild solution with very low alkali, it can be mixed and used with no danger. Irritation of the skin (as from splashing) is of no concern. The product is very stable and shows good stamina in use. Replenisher is available and is added at the rate of 2 oz. for each 80 square inches of film processed.

It has been demonstrated that a variation in the exposure time can be correlated with changes in the development time to achieve roentgenograms of comparable clearness.[7] The product used in this study allowed a greater reduction in exposure time than has previously been possible. Optimum results were achieved with the use of extra-fast *x*-ray film and a longer development time. Present tests at Billings Memorial Hospital, Chicago, have shown results similar to these findings.[8]

At a solution temperature of 68 F, the films were developed for three minutes for the best results at the faster exposure speeds as compared with 1½ minutes for the conventional method. At 73 F. development time was two minutes. Developer temperatures can range from 65 F. to 85 F. with the development time shortened as the temperature rises. A quick test will show the proper time for the temperature present.

No changes in methods of fixation were necessary.

Plate A shows results of an exposure at 45 KVP, 20 Milliamperes, one-half second exposure with 1½ minutes development at 68 F.

Plate B shows the same subject at 45 KVP, 20 MA, ⅛ second exposure and three minutes development at 68 F.

Summary

The results of experiments with a new *x*-ray developer (PRA) show that a shorter radiographic exposure time is possible allowing greater safety to the radiographer and clearer roentgenograms with less blurring. A compensatory increase in development time is necessary for optimum results.

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Hemostatic Ointment

A special hemostatic ointment made from 25 parts white gelatin, 10 parts zinc oxide, 10 parts calcium chloride, 5 parts glycerine, 5 parts sulfachrysoidine and 50 parts of distilled water, has been used as a practical method for stopping spontaneous nosebleeds. At normal room temperature, the ointment is whitish, firm and pliant, and without odor.

Before use, it is heated gently to soften. It is then applied on a small piece of cotton soaked in the ointment and left in the nasal cavity for one to two minutes. After the first application, the bleeding decreases markedly and stops completely after the second or third application. The ointment has no toxic after effects and is non-irritating to the mucous membrane.

Since much has been added to the body of knowledge that deals with heartworm disease during the past several years, its codified presentation should provide a searching review for the practitioner's consideration. Here the writers discuss treatment as well as preventive measures.

Canine Filariasis

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MUCH HAS BEEN ADDED to knowledge of heartworm disease during the past 11 years. Eleven years ago, thiacetarsamide (arsenamide, TDC no. 970) [Caparsolate Sodium—Abbott] was being introduced as the first drug with primary effect upon adult heartworms. Essentially all clinical work demonstrating the value of the drug in routine practice was conducted by members of the Florida Veterinary Medical Association.

Gaps in our knowledge of parasite biology handicapped serious consideration of prevention. Nothing was known of the developmental stages in the dog and there was considerable confusion on the respective roles of mosquitoes and fleas in transmission of the parasite.[26]

Now, a decade later, we have significant information on developmental stages of heartworm in the dog. Current investigations indicate that only mosquitoes transmit the infection. Fleas have been associated with an entirely different filaria. The 15-day course of treatment with thiacetarsamide (Caparsolate Sodium) has been reduced to a three-day course of treatment. And for the first time in history there is real promise of preventing the ravages of heartworm. Prevention would not be a community effort or a public responsibility, but would be the sole responsibility of the veterinary practitioner in the administration of preventive treatment to the dog.

Presented at the 29th Annual Meeting of the Florida Veterinary Medical Association, Fort Lauderdale, Fla., Oct. 12-14, 1958.

Mosquito Transmission

Bancroft in 1903 and 1904 presented the first experimental evidence that *Dirofilaria immitis* was transmitted by mosquitoes. In the succeeding half century, normal development has been traced in dozens of species of mosquitoes. Not all species, however, are equally effective in the transmission of the disease. Kartman[15] demonstrated that some species are killed by the number of microfilariae which they acquire from feeding on a heavily infected dog.

Much more work is needed to indicate the role of various species of mosquitoes. Although, the development has been traced by many workers in numerous species of mosquitoes, relatively few investigators have attempted to transmit the infection back to

dogs under controlled conditions. Bancroft, in Australia, at the turn of the century, was the first to report the experimental infection of dogs through the bite of infected mosquitoes (*Culex quinquefasciatus*). He reported the appearance of microfilariae in the peripheral blood nine months later. He also reported failure to find even developing forms in the heart of one dog killed 103 days after infection. Subsequently, Fulleborn[10] in Germany fed *Anopheles maculipennis* on *D. immitis* infected dogs and injected the resulting infective larvae into healthy dogs to complete the life cycle. Feng[9] in China accomplished the same result with *Aedes koreicus*. Weber and Hawkins[40] in England reported the development of worms in eight to ten months after the subcutaneous inoculation of infective larvae taken from the mouth parts of *Aedes aegypti*. Although animals in all these experiments appear to have been maintained under better control than in Bancroft's experiments, results are subject to some reservation since transmission back to dogs was artificial, *i.e.* by subcutaneous injection instead of mosquito bites. The most conclusive experiments to date are those of Kume and Itagaki[20] in Japan. Under carefully controlled conditions they transmitted the infection from experimentally infected mosquitoes back to dogs by injecting the infective larvae taken from the mouth parts of mosquitoes and by allowing the experimentally infected mosquitoes (*Aedes togoi*) to feed on clean dogs.

Development in the Dog

Kume and Itagaki presented the first direct evidence on developmental stages in the dog. These were found in the subcutaneous tissues, subserosa, muscles, and adipose tissue. The first young adults were found in the right ventricle of the heart two months after infection, but were not commonly found in this location until three to four months after infection. Worms found in the heart were as small as 3.0 mm. long and even five months after infection worms recovered from the heart were as little as 5.0 mm. long. The size of these young worms, when they first reach the heart, is a very important point in subsequent consideration of preventive treatment. The lengths are presented in relation to those of other stages in the life cycle in table 1.

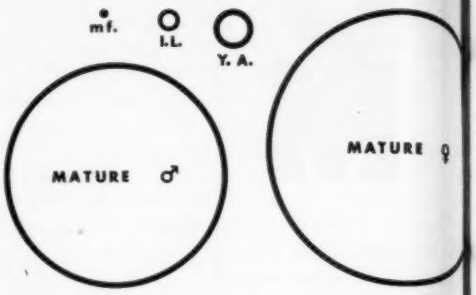

Fig. 1. Graphic comparison of the length, illustrated as the area of circles, of the several stages of *D. immitis* in the dog: mf., microfilaria; I.L., infective larvae; Y.A., young adult, when it arrives in the heart; MATURE MALE fully mature male in the heart; MATURE FEMALE fully mature female in the heart.

The average mature male is over 35 times longer, and the average mature female 75 times longer than the young adult when it first arrives in the heart. They are respectively 150 and 300 times longer than the infective larvae introduced into the dog by mosquito vectors. It will be seen from the illustration (figure 1) that microfilariae, infective larvae, and young adults as they arrive in the heart are collectively of one order of length in sharp contrast to much greater length ultimately attained by the fully grown worms.

The worm during its growth increases in width as well as in length. Infective larvae introduced into the mosquito are 0.025 to 0.030 mm.† wide, whereas the mature male is up to 1.0 mm. wide and the mature female up to 2.0 mm. Thus, in volume, the mature male is 150,000 times and the mature female over 1,000,000 times larger than infective larvae. It is probable that the mature male in volume is over 35,000 greater than the young adult as it arrives in the heart, and the mature female over 150,000 times larger.

Accumulated evidence, culminating with the report by Kume and Itagaki,[20] leaves little room to doubt that mosquitoes are not only capable, but do transmit heartworm

†We are indebted to Dr. Leo Kartman for permitting us to utilize his unpublished data on the width of the infective larvae.

from dog to dog. The relative effectiveness of the various species of mosquitoes in the transmission under natural conditions is yet to be determined.

Flea Transmission

What then is the significance of many reports of experimental infection by fleas? Breinl[4] in Australia first reported development of a dog filaria in both the dog flea and the cat flea (*Ctenocephalides canis* and *C. felis*). Furthermore, he reported that development was in the malpighian tubules of the flea, the same as in the mosquito. Brown and Sheldon[6] in North Carolina also reported the development of a dog filaria in malpighian tubules of fleas (*C. felis*) taken from an infected dog. Although Summers[37]

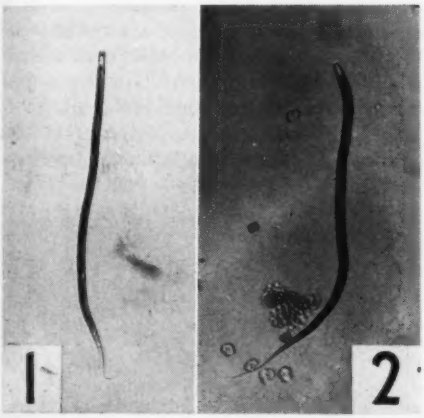

Fig. 2. Comparative sizes of microfilariae fixed in 2% formalin, stained in 1:1000 methylene blue. Photomicrographs X140. 1—Dipetalonema sp.; 2—*D. immitis*.

in Louisiana was able to obtain development of a dog filaria in both the dog and cat flea (*C. canis* and *C. felis*) as well as more slowly in the human flea (*Pulex irritans*), he emphasized that development was in the hemocele and not in the malpighian tubules. Bradley[3] in Tennessee also reported development in the cat flea. Stueben[34] in Florida confirmed development of a dog filaria in the hemocele of *C. canis*, *C. felis*, and *P. irritans* and in addition obtained such development in *Xenopsylla cheopis*, *Echidnophaga gallinacea*, and *Orchopeas wickhami*. Stueben further notes that development in the hemocele did not kill the fleas and

TABLE 1. The Comparative Lengths of Various Stages of *Dirofilaria immitis* in the Dog

Stage	Length (mm.)
Microfilariae in peripheral blood	0.300-0.325
Infective larvae introduced by mosquito	0.9-1.0
Young adults, as they arrive in the heart	3.0-5.0
Mature adults in heart: males	150.0-180.0
females	250.0-300.0

contrasts this with high mortality rate in some mosquitoes from developing filaria in malpighian tubules. He concludes from this, the high infection rate in fleas, and the fact that they are closely associated with dogs, that "these insects are most likely the natural vectors of canine filariasis." This appears to be a reasonable deduction from experimental data, but can hardly apply to *Dirofilaria immitis*.

Such a sweeping conclusion disregards the epizootological evidence and can hardly be accepted without evidence of transmission from the flea back to the dog. It is germane to the discussion that all of these studies on the development of a dog filaria in fleas were conducted before evidence existed that there are at least two distinct species of filaria in dogs in the United States. Apparently, in common with most of us, these workers assumed that any microfilariae in the peripheral blood of the dog in United States were those of *Dirofilaria immitis*. Certainly none have indicated that there was critical examination to verify that all microfilariae were specifically of this species. In no instance were postmortem examinations made to verify the existence of adult filariae in the heart. Newton and Wright[28] reported for the first time in the United States a microfilaria in the peripheral blood of the dog smaller than, and morphologically distinct from the microfilariae of *D. immitis*. They reported the presence of these microfilariae in the blood of dogs in which no heartworms could be found on necropsy. They have associated them in at least one dog with a species of Dipetalonema in subcutaneous tissues. They suggest[24] that this parasite is similar to, and may perhaps be, *Dipetalonema reconditum* which previously has been reported from dogs in Europe. Furthermore, they found that this microfilaria developed normally in the hemocele of the dog and cat flea

but did not develop in the mosquito, *Anopheles quadrimaculatus*. Conversely, typical *D. immitis* microfilariae from dogs, subsequently revealed on necropsy to harbor adults in the heart, developed normally in the malpighian tubules of the same mosquito, and did not develop in the flea. Some other failures to infect fleas appear, now, to have particular significance. Phillip[22] in Boston failed to obtain development in fleas fed on a dog which readily infected six species of mosquitoes (*Aedes cinereus, A. excrucians, A. triseriatus, Anopheles quadrimaculatus, A. punctipennis,* and *Culex territans*). Brown and Sheldon[4] were unable to find developmental stages in fleas from "heavily infected dogs" but found such development in fleas from one lightly infected dog. Taniguchi, Kume, Mitsuteru, and Itagaki[28] in Japan and Rosen[23] in Taihiti found no development in fleas taken from dogs that on necropsy revealed *D. immitis* adults in the heart; Rosen in fact suggested that *Dipetalonema reconditum* should be considered in relation to development in the flea. Similar negative results in the flea have been reported in Germany by Kosuge[17] and in France by Joyeux and Sautet.[14] Thus, it seems probable that mosquitoes and only mosquitoes are effective vectors of the heartworm *Dirofilaria immitis*. It is probable that the flea, at best, can only transmit this infection on rare occasions and it is possible to hazard the guess that fleas are incapable of transmitting *D. immitis*. The question, however, is in need of clarification.

Identification of Microfilariae

Living active microfilariae can be detected easily in fresh blood. Dead microfilariae in fixed preparations may be more difficult to find, however. Thus, when it was assumed that only microfilariae of *D. immitis* occurred in the peripheral blood of dogs, direct examination of a drop of blood or utilization of a concentration technic which did not kill microfilariae was preferred in routine practice. Desirability of distinguishing *D. immitis* microfilariae from those of Dipetalonema sp. and perhaps

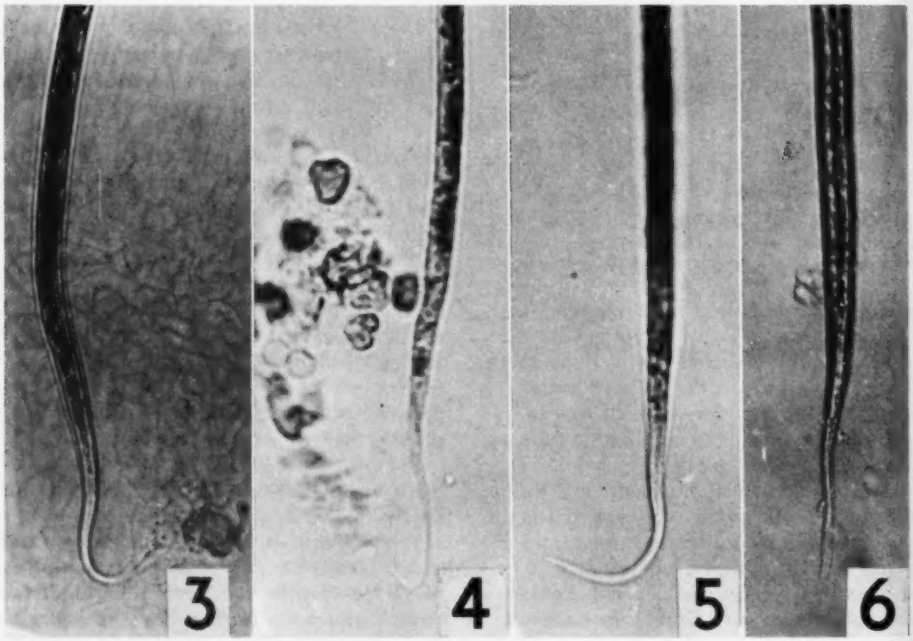

Fig. 3. Appearance of tails of microfilariae fixed in 2% formalin, stained in 1:1000 methylene blue. Photomicrographs X560.; 3, 4, and 5—Dipetalonema sp.; 6—*D. immitis*.

TABLE 2. Comparison of the Fixed Microfilariae of *Dirofilaria Immitis* and Dipetalonema sp. from the Peripheral Blood of Dog

	D. immitis	Dipetalonema sp.
Shape of tail	Straight	"Button-hooked"
Anterior end	Nucleated	Transparent
Terminal body nucleus	Deep in tail	Well back from tail
Average length (mm.)	315	275
Average width (microns)	7.0	4.5
Arrangement of G. cells	1-2-1	1-3

others has presented a new set of values. Microfilariae are most easily differentiated when they are killed and stained in an extended position. When whole blood is lysed in 2% formalin, any microfilariae present are usually fixed in an extended position. Thereafter they may be stained. It has been found convenient to lyse the blood by shaking it a few times in ten volumes of 2% formalin in a 15 cc. conical centrifuge tube. At any time from 15 minutes to 48 hours later, the specimen may be centrifuged and the supernatant fluid discarded. Residue, which mainly consists of leukocytes and cellular debris, will include any microfilariae present. A drop of this residue may be added to a drop of 1:1000 aqueous methylene blue on a slide for examination. Even better staining may result from adding an equal volume of the stain to the residue in the tube. Such stained residue may be bottled and stored for future reference.

Microfilariae of *D. immitis* are about 1¼ times longer and nearly twice as wide as those of Dipetalonema sp. (table 2, figure 2). This is most readily seen in mixed infections but after a little experience becomes noticeable in slides containing only one species. The most conspicuous feature, however, is the appearance of the tail. The pointed tail of *D. immitis* microfilariae usually ends in a straight line with the body when fixed in fluid, whereas the tail of Dipetalonema microfilariae ends with a sharp bend or kink. Newton and Wright term it button hook (figure 3), in over 90% of the specimens. This distinguishing character is not seen in the living specimen or in the thin blood smear such as one makes for the differential leukocyte count. With more critical staining than is possible with methylene blue, further supporting evidence may be observed in the characteristic location of the terminal nucleus as well as the appearance of the anterior end. Although the arrangement of G-cells is probably the most significant of the differential characters, they are difficult to identify with any of the stains available for routine use. Accordingly, they have little practical value in routine practice, but are worth checking in well stained specimens. The character of the tail in microfilariae promptly fixed in liquid medium becomes the most practical differential characteristic. Other characteristics are of supporting value in routine practice.

Distribution in United States

There are few useful data on distribution of heartworm in the United States. Most surveys utilized the microfilaria index, and were made before recognition of Dipetalonema in this country. Newton and Wright found only the microfilariae of Dipetalo-

TABLE 3. The Prevalence of Adult Heartworms Found in Dogs Examined Post-mortem in Surveys

No. Dogs Examined	% With Worms in Heart	Avg. No. (or range) of Worms	% With Microfilariae	% With Either or Both	Location & (Reference)
75	72	(12-122)	±63	—	Gainesville, Fla. (Steuben, 1954)
186	25	(1-116)	30	34	Savannah, Ga. (Brown, 1939)
93	25	7 (1-48)	24	32	New Orleans, La. (Hinman, 1935)
890 Mature	33	—	—	—	New Orleans, La.
425 Immature	6	—	—	—	(Hinman & Baker, 1936)
153	33	(1-38)	—	—	Clarkdale, Miss. (Ward & Franklin, 1953)
200	1	—	76	76	Montgomery, Ala. & Columbus, Ga. (Mundhenk & Greene, 1939)
204	5	7	21	22	Memphis, Tenn. (Eyles, et.al., 1954)

nema sp. in 15 of 18 blood positive dogs out of 250 examined from Maryland, Pennsylvania, and New Jersey; three contained only microfilariae of *D. immitis*. In five of eight blood positive dogs from Norfolk, Va., only *D. immitis* were found; in three Dipetalonema were found. They conclude that both species probably occur in the south, but that in the north Dipetalonema is probably the common filariid of dogs with *D. immitis* occuring relatively infrequently. Lindsey in a current study in Mobile, Ala. has found microfilariae of *D. immitis* in over 40% of dogs and Dipetalonema sp. in about 20%. Both species were found in 7% of these dogs.

Heartworm Surveys

Surveys to determine prevalence of worms in the heart have been conducted in only the south (table 3). The data suggest that within the south infection is most prevalent and individual infections are heaviest near the seacoast. The highest rate reported is at Gainesville, Fla. Heavy infections are reported in both Savannah, Ga., and New Orleans, La. The only comparable rate inland is reported from Clarksdale, Miss. Significantly lower rates are reported from Memphis, Tenn., and from Columbus, Ga. and Montgomery, Ala. Heartworms are found commonly in dogs along the seacoast from Florida to New Jersey although adequate prevalence data are not available north of Savannah. During World War II, the writers obtained microfilaria positive dogs from the seacoast area of New Jersey and Maryland for therapeutic studies and with rare exceptions found adults in the heart, or dead adult worms in the pulmonary artery, on postmortem examination. On one occasion, with the cooperation of Dr. Ronald Jackson, two assistants examined mongrel dogs in one of the lower economic communities near St. Augustine, Fla. in order to purchase a dozen suitable for chemotherapeutic studies. They examined 20 dogs and selected 13 (65%) of these as heavily infected. Upon subsequent postmortem examination, all contained mature heartworms. The most heavily infected is a classical museum specimen today, and is estimated to contain well over 200 worms. The lightest infection was three worms.

Although survey data are too few to permit an unequivocal conclusion, the indications that infection is heavier as well as more prevalent along the seacoast than inland is supported by the experiences of practicing veterinarians. From Florida west along the gulf and north along the Atlantic the characteristic cough, decompensation, and ascites present a recurring set of symptoms, all well known and readily recognized. In the past, at least, this syndrome has been encountered much less frequently inland. Accordingly, it may on occasion be missed. Yet the infection is undoubtedly widespread throughout the southeastern United States. It may be termed endemic throughout the southeastern United States, but hyperendemic along the seacoast with Florida probably in the most hyperendemic area. No critical data from the west coast is available, but verbal reports suggest a comparable situation. The reason for greater prevalence and intensity along the seacoast has never been adequately explained. Some years ago it was suggested[20] that the explanation might involve salt marsh mosquitoes. The suggestion that salt marsh mosquitoes might have a greater vector capacity has not been investigated. Certainly, the density of salt marsh mosquitoes exceeds that of the fresh water mosquitoes in most inland areas. Eyles, Gibson, Jones, and Cunningham[9] and Kartman[16] suggest that even fresh water mosquitoes may be more numerous in the coastal water areas than inland.

The relative prevalence of heartworms farther north is even less clearly depicted. Newton and Wright[24] suggest that Dipetalonema is the dominant canine filaria in the north and that *D. immitis* is rare. Biologically it would seem that a flea transmitted species, such as Dipetalonema appears to be, would be less adversely affected by unfavorable climatic conditions than a mosquito transmitted species. It would be easy to assume, then, that essentially all the northern canine filariasis was flea transmitted, *i.e.* Dipetalonema. The situation, however, is not so simple. Bona-fide cases of heartworm are being reported with in-

creasing frequency in the north. Durrer[7] has reported a case in central Indiana in a dog whose owner contends had never been south of that area. In our laboratory recently we have seen typical *D. immitis* microfilariae as well as Dipetalonema microfilariae in dogs from central Illinois and central Indiana. Word of mouth reports indicate that heartworms are frequently seen in the clinic at Ohio State University School of Veterinary Medicine. Recently in Central Michigan the writers saw a heavily infected heart removed from a dog reported as never having been out of that state.

Dr. T. A. Hymas and Dr. S. P. Curell report finding heartworms on postmortem examination of several local dogs in and near Midland, Mich.; the dogs never had been out of Michigan according to the owners. Nielson[25] reported a microfilaria positive Canadian dog with typical heartworm symptoms. The dog had never been out of that country but was in a kennel with infected dogs from southern United States. There is a growing impression that the disease is spreading.

Some skepticism was warranted since the impression persisted that unfavorable climatic conditions would arrest development in the mosquito during most of the year. However, recurring evidence is difficult to deny. One is forced to conclude either that it is spreading in north central United States or that it has long been there undetected. Increasing canine traffic between the north and south provides ample opportunity to infect northern mosquito vectors. This is illustrated by the Canadian case cited. Recently, Stone[26] reported that a Fox Terrier born, raised, and apparently infected in Savannah, Georgia, died of heartworm after living in Detroit, Michigan, for several years; "hundreds" of worms were found in the heart on postmortem examination. There was ample opportunity for this one dog to infect mosquitoes during several summers.

The situation has been much confused by the unrecognized occurrence of Dipetalonema, the adult of which lives in subcutaneous tissues. More data are needed on the relative distribution of *D. immitis*, Dipetalonema, and other hitherto unrecognized species. Mixed infections with *D. immitis* and Dipetalonema have been noted in laboratories used by the writers in more than one dog from the Illinois-Indiana area. The microfilariae of another as yet unidentified species was also found in one of these dogs.

The writers have also heard of a third species observed in two other laboratories. Whether all three represent the same additional species or two or more additional species is yet to be determined. Captain Donald L. Price has advised the writers that he has found four species of microfilariae in dogs from the Bahamas, and he feels certain that these also occur in the United States, at least in Florida. It seems improbable, however, that any of these could be of significance to the health of the dog comparable to that of *D. immitis*. They probably serve mainly to complicate and confuse the recognition of the latter. It is a challenge to recognize *D. immitis* and to ascertain more accurately its distribution.

Treatment

In any consideration of treatment, it is well to recall that all evaluated therapeutic agents have been demonstrated to be either primary microfilaricides or primary adulticides. Only the substituted phenylarsenoxides have been shown to primarily destroy adult worms.[29,30,21] Of the phenylarsenoxides, thiacetarsamide (arsenamide) was first introduced for this purpose and has been used successfully in routine veterinary practice for well over a decade. The recommended dose schedule, since its introduction until this year, has been 15 daily intravenous doses.[26,29] In these studies animals were sacrificed (dogs or cotton rats) immediately upon completion of treatment. Thus it was concluded that a minimum of 15 daily doses was necessary to routinely kill all adult worms. Kume[21] found that the rapidity with which adult filariae were killed by antimony was inversely related to the number of doses. Since the therapeutic dose of antimonials was well up into the topical range for dogs, no attempt was made to develop the practical use of drugs containing this metal. However, he applied the same principle to the use of another phenylarsenoxide, dichlorophenarsine hydrochloride (Filarsen), and found that dogs receiving three daily

doses, at the rate of 1.0 mg. as./kg./day, contained only dead worms ten days or more later. With two such daily doses all worms were dead in 20 to 30 days. Thus he was led to conclude that dichlorophenarsine hydrochloride was more rapid than thiacetarsamide sodium in its action against the heartworms.

Subsequently, Kume and Itagaki[20] directly compared the two compounds and found that they had essentially the same activity against the heartworms. Ten days after three daily doses, 94% of adult worms were dead following dichlorophenarsine hydrochloride and 97% were dead following thiacetarsamide sodium. Bailey,[2] using even lower doses (0.75 mg. as./kg.) and sacrificing his dogs 21 days after initiation of treatment, found that after two or three doses 96 to 100% of worms were dead following thiacetarsamide sodium and 86 to 99% were dead after dichlorophenarsine hydrochloride; 96 to 97% were dead following a related phenylarsenoxide, oxophenarsine hydrochloride (Mapharsen — Parke-Davis). The three compounds appear to be almost identical in their action on the adult worms. Certainly any difference would not be in favor of the dichlorophenarsine hydrochloride but rather would appear to favor thiacetarsamide sodium.

From the standpoint of toxicity, they are essentially the same.[21,2] Oxophenarsine hydrochloride, despite its earlier antiluetic use in humans, has been little used in the dog; dichlorophenarsine hydrochloride has been used even less in either man or canine. Thiacetarsamide sodium alone has had extensive use as a canine medicine in routine practice. Relatively few severe toxic reactions have been reported in more than a decade of use in the 15-day course of treatment for heartworm. Bailey[2] found no evidence of serious pathological alteration or toxicity as a result of therapy with any of these drugs in the three day treatment. Furthermore, he presented evidence that minor pathological changes in the liver and kidneys, which might have been mistaken for arsenic poisoning, were actually produced earlier by filariasis or by leptospirosis.

It would appear that any choice would be in favor of the time proved drug—thiacetarsamide sodium. There is another equally important consideration for the busy practitioner who must administer the medication. Neither, dichlorophenarsine hydrochloride nor oxophenarsine hydrochloride is stable in an aqueous solution. Thus either must be packaged or ampuled as a dry powder and must be freshly dissolved immediately before each administration. Only thiacetarsamide is stable in an aqueous solution and can, therefore, be packaged in a multiple-use bottle.

Caparsolate Sodium is available as a 1% solution in 50 cc. multiple-use bottles. The currently recommended dose, to deliver approximately Bailey's 0.75 mg. as./kg. is 0.2 cc. per pound of body weight (1.0 cc. for every 5 lb.) intravenously daily for three days. Two such daily doses may be sufficient, but until more data are available, it seems conservative to recommend three daily doses.

The Need for Preventive Treatment

Upon destruction of the mature heartworms, they are swept into the pulmonary arteries where they form emboli. With long standing heavy infections, the results can be fatal. Jackson[12] reports that six out of seven dogs in critical condition from heartworm disease died from pulmonary embolism or complications arising from the embolisms following treatment. Bailey[2] reports the loss of 5% of over 400 dogs receiving routine treatment; the principal losses were from pulmonary embolism. The pathology resulting from chronic heartworm disease or from post-treatment emboli could be prevented if the infective larvae, upon introduction into the dog or the developmental stages in the tissues, could be destroyed. Unfortunately, no technic for doing this has been developed and none of the therapeutic agents available have demonstrated such activity. Diethylcarbamazine has been suggested for this purpose, but Soltys[24] has shown that it offers no such protection. Kume[21] has shown that an antimonial would destroy the developmental stages in doses which produced critical toxicity in all treated dogs. He suggested that the phenylarsenoxides offered the best prospect but presented no experimental evidence in support.

Preventive Treatment

Kume has, however found that phenylarsenoxides will destroy young adults as they arrive in the heart. He is currently recommending the treatment of dogs in Japan during December or January, regardless of whether they exhibit microfilaremia. The purpose is to destroy young worms soon after they arrive in the heart, but before they have matured. Bailey[1,2] reports that such treatment is proving successful with Air Force sentry dogs in Japan. Bailey, however, recommends that treatment be given a little later, no earlier than January but no later than April. Bailey further suggests that, in tropical areas with a long mosquito season, treatment be given twice a year in such a preventive program. This is a unique and forward looking program for the prevention of the ravages of heartworm disease. It has never been tried in the United States, therefore no local experience is available.

Even in Japan, where the technic has been developed by Kume and Bailey, the best time to administer the preventive treatment has not been sharply pinpointed. Both Kume and Bailey point out that the young adult worms in the heart are not always 100% killed by doses that can be depended upon to regularly destroy the fully mature worms. They stress, however, that with such periodic treatments heavy infections can be prevented and many dogs will never harbor fully mature worms. The inconvenience, the dangers, and costs of such periodic treatments are insignificant in comparison with the irreversible pathological lesions it may prevent. Destruction of all or part of the worms 5 to 10 mm. long would produce comparatively little pulmonary damage. Destroying young worms at this stage of development would prevent damage caused by mature worms and prevent damage of long standing infection. It would eliminate the necessity of destroying fully mature worms with further damage to lungs in an animal already suffering pathological effects of long standing infection.

For preventive treatment both Kume and Bailey recommend the same two or three daily doses used in therapy. In view of evidence that these young adult worms may be a little less susceptible to therapy than fully mature worms, the three day course of preventive treatment is suggested until more detailed information is available. The most effective time of the year to administer such preventive treatment in the United States is still a matter for speculation. The guiding principle, however, is to administer the treatment three to five months after the dog receives the infective larvae from the mosquito. In a highly endemic area with a long mosquito season, as in Florida, it would be appropriate to consider one such treatment in September or October and a second in March or April. Farther north a single annual treatment administered in January might prove effective. Similarly, a dog hunted in a highly endemic area during the mosquito season might be spared much injury by treatment four to five months after return to an area of lower endemicity.

For such prophylactic treatment the recommended dose is the same as for therapy, namely, 0.2 cc. per pound of the 1% solution administered intravenously daily for three days.

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Intervetebral Disc

While attending a gathering of small or pet animal owners and breeders when "intervetebral disc (intervetebral fibrocartilage) protrussion" was being informally discussed, an occasional allusion was made to this condition as "slipped disc," and that it was replaced by manipulations, and that there was a "click"—undoubtedly fancied—when this was effected. Veterinarians questioned the foregoing because during their early classroom instruction in anatomy they had the understanding that the intervetebral fibro-cartilage has a peripheral outside ring (fibrous ring) and a soft center (pulpy) nucleus), and that this latter is under considerable pressure. Also, the disc is thickest ventrally. Furthermore the spinal cord of the dog fits quite snugly in the neural canal. Therefore in intervetebral protrussion it is the semi-fluid center that is forced into the neural canal with resulting compression of the spinal cord in its narrow canal. As clinical signs, incoordination in the action of the dog's limbs—sometimes partial, or complete parapligia—are common, the latter more frequent when the disc in the cervical region is compressed or injured. A very able presentation of this matter appeared in the September 20, 1958 issue of the British Veterinary Record.—*R. R. Dykstra, D.V.M.*

This photographic clinical report records therapeutic results observed after treating dogs for nonspecific dermatitis with the new steriod, predisolone trimethylacetate.

Control of Nonspecific Dermatitis in the Dog

S. POLLOCK, D.V.M.

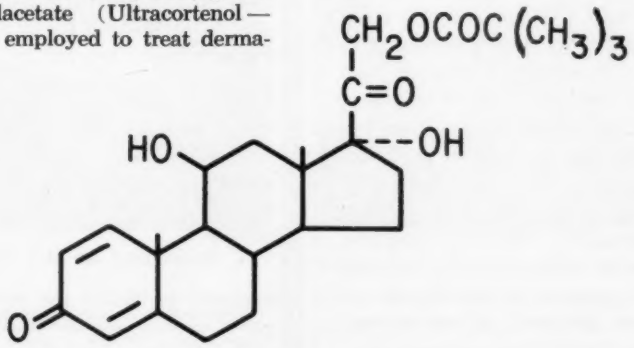
South Orange, New Jersey

PROFESSIONAL LITERATURE[1] cites many studies which demonstrate that nonspecific dermatitis in small animals can be successfully managed with steroid therapy. Nevertheless the search for a more effective compound continues. Just as hydrocortisone has proved more active than cortisone, so prednisolone has gained wider use than prednisone because of enhanced potency.[2-5]

Predisolone Trimethylacetate

More recently a new compound, predisolone trimethylacetate (Ultracortenol — Ciba), has been employed to treat dermatoses in the dog[6] and correct ketosis in dairy cattle.[7] Prednisolone trimethylacetate is a white crystalline substance which is suspended in an aqueous medium and administered intramuscularly. The drug has been derived from the parent substance, prednisolone, by esterification with trimethylacetic acid.

The structural formula follows:



Pharmacological Activity

Biologic tests indicate that prednisolone trimethylacetate, given subcutaneously or intramuscularly to rats in single doses, differs from prednisolone in two important respects:[8,9]

1. Weight-for-weight, prednisolone trimethylacetate has a greater total activity than prednisolone when given to laboratory animals. The Liver Glycogen Test is cited as experimental evidence of enhanced activity: in this test, single injections of 0.05 mg. of the glucocorticoid were administered to fasted rats. Six hours later the animals were killed and autopsy performed to determine the glycogen content of the liver. At that time, the liver-glycogen values of prednisolone-treated animals were eight times that of the control animals. But rats given prednisolone trimethylacetate had values 25 times those of the control values.

2. Prednisolone trimethylacetate is more potent, with a longer duration of action, than the parent compound. These conclusions are borne out by the observation that rats, given prednisolone trimethylacetate, underwent a greater and more prolonged suppression of adrenal growth, of body weight, and of the thymus gland than rats given prednisolone. In still another biological test, adrenalectomized rats, treated with prednisolone trimethylacetate, survived for longer periods than animals treated with prednisolone.

In the foregoing tests, prednisolone trimethylacetate induced a more marked physiological response than prednisolone and evidenced a duration of activity two to three times longer than prednisolone.

Clinical Study

To study the clinical effectiveness of prednisolone trimethylacetate, nine dogs with nonspecific dermatitis were given intramuscular injections of the new drug. Dermatitis was considered to be "nonspecific" when microscopic skin scrapings, fungus cultures* and Woods Light studies were negative. Lesions were generally inflamed and accompanied by pain and pruritus. Dosage strengths varied between 10 and 25 mg., depending on the weight of the patient. An insecticide named Flea-go (Fort Dodge), Phisohex (Winthrop) and Vioform-Hydrocortisone Cream (Ciba) were given to several patients as adjunctive measures.

Results

Only one intramuscular injection was needed to relieve pain and induce healing of lesions in six of the nine patients. Two of the patients required two doses and one patient, three doses.

Response to therapy was marked by rapid disappearance of inflammation, steady healing of lesions and cessation of scratching, indicating beneficial relief of pruritus. The following case histories and color prints accompanying this report, which show results of treatment, indicate that prednisolone trimethylacetate proved effective not only against innocuous lesions, but also against hemorrhagic dermatitis associated with exquisite pain.

Conclusions

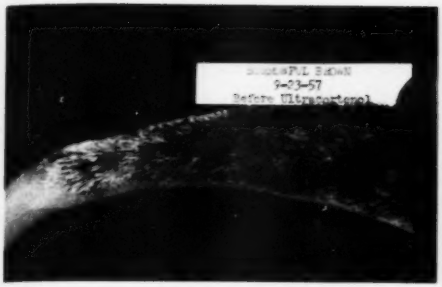
In this series of cases, these important facts should be noted:

1. Within a relatively short time following administration, the patients experienced a beneficial relief of pruritus. This development marked the beginning of the recuperative phase.

2. Highly satisfactory therapeutic responses were achieved with either one, two or three doses of prednisolone trimethylacetate.

3. Depending on the dosage (10 to 25

*Specimens were cultured at the Mycology Laboratory of the Communicable Disease Center of the U.S. Public Health Service, Department of Health, Education and Welfare, Chamblee, Georgia.



Before treatment. Severe dermatitis of tail.

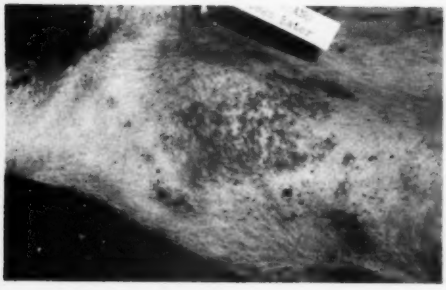
Before treatment. Severe dermatitis of groin and testicles.

Four days after treatment.

Two days after treatment.

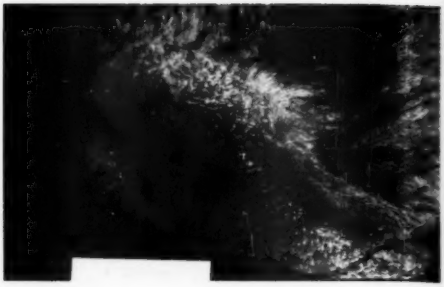
Three weeks.

Sorrowful Brown (see case history). Ultracortenol 20 mg. given as a single injection.

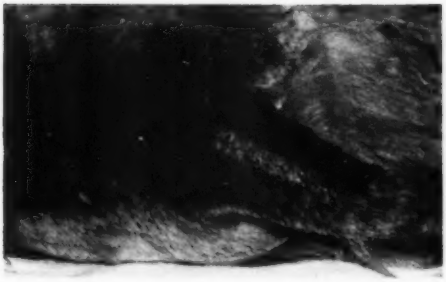


Four weeks.

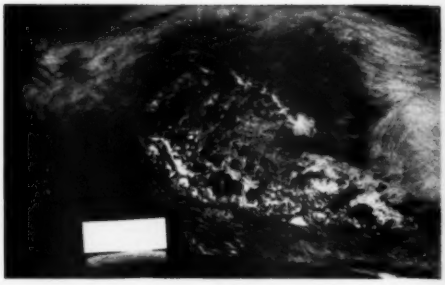
Teddy Morano (see case history). Ultracortenol 15 mg. given as a single injection.



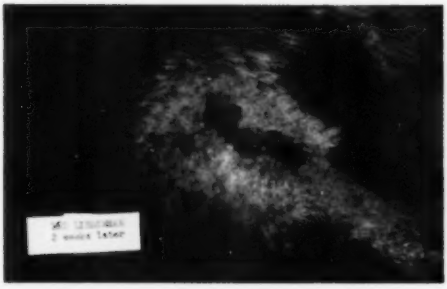
Before treatment. Severe hemorrhagic dermatitis of tailhead.



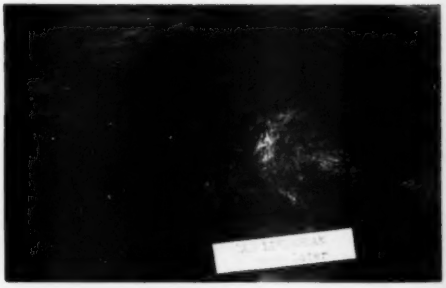
Two days after initial dose.



Ten days (second dose at day 7).



Two weeks.



Six weeks.

Lad Lieberman (see case history). Ultracortenol® 25 mg. given as initial injection. Second dose given 7 days later. Vioform®-Hydrocortisone Cream b.i.d., used as an adjunct.

TABLE 1. Clinical Study of Prednisolone Trimethylacetate in Nine Patients

Case	Condition	Treatment	Results	Comments
Goldie Jaeger Cocker Male, 9 yr.	Erythematous lesions of abdomen with severe pruritus of 7 days' duration. Home remedies gave no relief.	Area shaved and bathed with Flea-go. Ultracortenol 10 mg. given 3 times over period of 1 week.	Erythema disappeared, patient stopped scratching in 2 days. Lesions completely healed 15 days after treatment.	Scrapings negative. Specimen sent to mycology laboratory for confirmation.
Pinky Walter Mixed Cocker Female, 14 yr.	Severe scaly dermatitis of back and tail with extreme pain.	Trimmed and bathed with Flea-go. Given Ultracortenol 15 mg. Only 1 dose needed.	Erythema and pain subsided in 2 days; no scratching. Lesions well healed 17 days after treatment.	Scrapings negative. Specimen sent to laboratory for confirmation.
Nickie Finnan Cocker Male, 7 yr.	Severe generalized erythema with moist eczema of neck, back, shoulders. Severe pruritus.	Entire body shaved and bathed with Flea-go. Ultracortenol 15 mg. given twice, 10 days apart.	Pruritus relieved 1st day. Lesions becoming dry, erythema subsiding on 2nd day. Lesions completely healed in 3 weeks.	Photos taken showing beneficial response.
Star Ranger Daley Fox Terrier Male, 5 yr.	Irritation of groin with erythema and pruritus. Anal glands slightly enlarged.	Glands emptied and packed. Ultracortenol 15 mg. administered. Only 1 dose required.	Good response in 2 days. No signs of irritation 15 days later.	
Sorrowful Brown Basset Male, 1 yr.	Severe dermatitis of tail with purulent exudate and much pruritus.	Shaved and cleaned with Phisohex. Ultracortenol 20 mg. single dose.	Lesions well healed in 4 days, no pruritus. Complete healing with growth of hair over lesions in 1 month.	Scrapings negative; photos taken.
Brownie Hahn Mixed Terrier	Irritation of groin, evidenced by erythema.	Ultracortenol 15 mg. single dose. "H" Ointment daily.	Lesions completely healed after 10 days.	Photos taken.
Teddy Morano Collie Male, 5 yr.	Severe erythema of groin, and testicles, intense pain, swelling, irritation. Medical aspects of thigh exhibited areas of purulent exudation.	Shaved hair, lesions cleaned with Phisohex. Ultracortenol 20 mg. single dose.	Erythema subsided in 2 days; scab forming on right groin. Complete healing after 3 weeks.	Scrapings negative. Specimens submitted to laboratory. Photos taken.
Shelly Campbell Sheltie Female, 6 yr.	Erythema of neck with pruritus.	Trimmed hair, washed lesions with Phisohex. Ultracortenol 15 mg. single dose.	Good response after 7 days.	Photos taken.
Lad Lieberman Collie Male, 6 yr.	Severe hemorrhagic dermatitis of tailhead with purulent exudate. Patient mutilated tail because of intense pruritus.	Ultracortenol 25 mg. on 10/14/57 and 10/21/57. As an adjunct, Vioform-Hydrocortisone Cream b.i.d. on 10/14,16,18, 19 and 23/57.	Slow healing after 5 days. Firm protective scab after 9 days. Lesions completely healed after 7 weeks.	Scrapings negative. Woods Light negative. Photos taken.

mg.), the duration of the anti-inflammatory effect varied from 7 to 10 days for a single intramuscular injection.

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Ferrets

Ferrets are discussed by T. Hume Bissonnette, Trinity College, in a book on laboratory animal management.* The domesticated ferret is believed by some to be an albino variant of the wild polecat. They interbreed with the polecat readily. The brown ferret of England is believed to be a cross between the ferret and the polecat.

Ferrets are easily tamed. Neither sex exhibits fear of man or lower animals. They are vicious biters when teased. Like weasels and polecats, if loose in a chicken coop, they kill for pure joy. Unlike polecats, they are sensitive to cold and damp and are susceptible to a fatal foot-rot caused by an itch mite. When angered or excited, they emit an extremely offensive, nauseating odor.

Naturally ferrets will not breed from early September to March, but by controlled lighting they can be made to breed the year around. In the unmated female, estrus is continuous from March to August. The gestation period is 42 days. As in the rabbit and cat, ovulation occurs only after coition or other sexual stimulation. Successful copulation lasts from ten minutes to three hours. The os penis is almost as long as the femur and of about one-half the diameter of the latter.

Ferrets are extremely susceptible to canine distemper, cat distemper and to human influenza viruses.

*The Care and Breeding of Laboratory Animals, edited by Edmond J. Farris. John Wiley & Sons, Inc., New York, New York.

The Dog and the Flea

Why do not dogs, equipped as they are with tooth and nail, rid themselves immediately of any flea settling down to housekeeping on their backs?

A possible answer comes from Japan, where Dr. Manabu Sasa of the University of Tokyo has found that the flea bides its time and settles only on the sleeping dog. While the dog is up and about, the flea is quiescent; but when the host lies down for a snooze, it perks up and looks for supper.

The flea's behavior, says Dr. Sasa, appears to be due to the exciting effect of very small increases in the carbon dioxide concentration of the surrounding air when the dog goes to sleep. — *Medical News, December 1958.*

Lens Loosener

A radical new approach to cataract surgery, in which chymotrypsin is used to loosen the lens from its zonular moorings, was reported to the American Academy of Ophthalmology and Otolaryngology by Dr. Derrick T. Vail. The technic devised in Spain consists of injecting alpha chymotrypsin into the anterior chamber immediately after incision of the cornea. The eye is then thoroughly washed to prevent excessive concentration of the enzyme.

Since chymotrypsin attacks the zonular fibers, the lens becomes "virtually dislocated." It can then be more easily removed with erysiphake, often without applying the customary external pressure.

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ALLIED LABORATORIES, INC.
Indianapolis 6, Indiana

Controlled experiments with a crude dried broth of S. hygroscopicus *containing hygromycin B was found to possess anthelmintic qualities when administered in feed to swine. No toxicity was noted.*

Using enterotome to split small intestine to recover ascarids.

Anthelmintic Effect of Hygromycin B in Swine

MAX C. McCOWEN, M.S., FRANK O. GOSSETT, D.V.M.
MAURICE E. CALLENDER, M.S., MILO C. BRANDT, M.S.

The Lilly Research Laboratories
Indianapolis, Indiana

WORM PARASITES are recognized as one of the most serious problems of swine production. Anthelmintics such as sodium fluoride, phenothiazine and cadmium compounds have lacked many advantages required of a good anthelmintic for swine. Goldsby and Todd[1] have suggested that an anthelmintic for livestock production should be sufficiently non-toxic to be administered in the feed over a period of time and sufficiently palatable and effective to attack all species of helminths present.

Recent literature[2-3] has demonstrated that certain piperazine derivatives possess anthelmintic action against ascarids and to a lesser degree against nodular worms in swine. Present anthelmintics for swine have not proved effective when used as oral therapy against two important groups of worm parasites. These are lungworms and whipworms.

The ideal anthelmintic should be effective against most worm parasites found within the swine host. If an anthelmintic medicated feed depresses the production of worm eggs and swine are found to be free of worms at necropsy, then worm parasite population in swine herds should become greatly reduced.

A new antibiotic, hygromycin[4] has been isolated from strains of *Streptomyces hygroscopicus* (Jensen, Waksman and Henrici). In addition to the anti-microbial properties of hygromycin, this antibiotic has been found to have anti-parasitic properties.[4-5]

The present report is concerned with the anthelmintic efficacy of crude dried broth of *S. hygroscopicus* containing hygromycin B administered in the complete feed of swine. *S. hygroscopicus* has been found to produce hygromycin A and hygromycin B. Although Goldsby and Todd[1] have reported

hygromycin A to have certain anthelmintic effect when fed to swine, much greater efficacy has been demonstrated with hygromycin B (Hygromix — Eli Lilly).

Materials and Methods

Twenty-eight pigs with an average weight of approximately 100 lb. were purchased from three different farms in central Indiana. All pigs were immunized against hog cholera. At least three fecal examinations at weekly intervals, using the sugar flotation method, were made on each pig to determine the worm parasites harbored before the crude dried broth of *S. hygroscopicus* was administered in the feed. According to the egg counts, pigs were infected with Ascaris, Oesophagostomum spp. or Hyostrongylus sp., Trichuris and Metastrongylus sp. The pigs were then allotted equally to four pens for the duration of the test. Seven pigs were fed a crude dried broth of *S. hygroscopicus* (lot 316-62AD-171) at a concentration of 25,600,000 units of hygromycin B per ton in the complete feed. Seven pigs were fed the antibiotic containing 12,800,000 units of hygromycin B per ton, and another seven were fed 6,400,000 units of hygromycin B per ton. The remaining seven pigs were fed a basal ration without any antibiotic and were used as controls for this test.

Egg counts were made once a week for five weeks on each of the medicated feed groups and on the control group.

Initial weights of pigs were recorded so that information could be compiled on weight gains and feed conversions when the experiment was terminated.

Results

Pigs on medicated feed after the second week revealed greatly reduced numbers of eggs for each of the several species of parasites, whereas most of the pigs in the control pen demonstrated approximately the same egg counts as initially observed. One control pig died two weeks after the test began. This pig harbored ascarids, strongyles, whipworms and lungworms. After five weeks of continuous feeding of medicated feed, it was found that most eggs of each of the several species of parasites were no longer passed in the feces. Pigs were killed, and postmortem examinations were made on the 27 pigs during a one week interval. Intestinal tracts and lungs were examined for presence of swine parasites (table 1).

All antibiotic fed pigs passed ascarids, and only one immature ascarid was found at necropsy. This ascarid was found in a

TABLE 1. Anthelmintic Efficacy of Hygromix Administered in the Feed to Swine

Crude Dried Broth	Conc.* in Feed Units/ton	No. pigs	Helminths	Recovered From Feces	Total Worms Recovered at Necropsy
S. hygroscopicus	25,600,000	7	Ascarids	12	0
			Nodular worms		0
			Lungworms		4
			Whipworms		0
S. hygroscopicus	12,800,000	7	Ascarids	17	0
			Nodular worms		0
			Lungworms		2
			Whipworms		0
S. hygroscopicus	6,400,000	7	Ascarids	38	1 (immature)
			Nodular worms		11
			Lungworms		12
			Whipworms		0
Controls	None	7**	Ascarids	0	19
			Hyostrongylus		3
			Nodular worms		316
			Lungworms		28
			Whipworms		0

*Units of hygromycin B assayed against *B. subtilis*.

**One pig died two weeks after the test began—egg counts and necropsy demonstrated that ascarids, strongyles, whipworms and lungworms were present.

Counting ascarids recovered at necropsy.

pig on the lowest concentration of medicated feed. Only four lungworms were found in three pigs out of seven fed 25,600,000 units hygromycin B per ton. Two lungworms were recovered from two pigs in the seven pig group fed medicated feed at 12,800,000 units hygromycin B per ton. Four of seven pigs fed at 6,400,000 units hygromycin B per ton were free of lungworms whereas the remainder harbored 12 lungworms. One pig in this group was found to harbor 11 Oesophagostomum spp. Six control pigs were found to have 19 ascarids, 3 Hyostrongylus sp., 316 Oesophagostomum spp. and 28 lungworms.

Discussion

Considering the data presented in this experimental study, the crude dried broth of *S. hygroscopicus* appears to be an effective anthelmintic for swine when used in a medicated feed. The antibiotic fed at three concentrations of hygromycin B per ton were all equally acceptable to pigs in their feed. There was no evidence of toxicity. Weight gains, as well as feed conversion, were favorable (table 2). Studies are now being conducted to determine specific information on weight gains and feed conversion. In each medicated group, ascarids were eliminated. No elimination of ascarids was observed in the control group.

Critical experiments revealed that all ascarids were removed except one immature worm found in the lowest concentration of antibiotic in the feed. No nodular worms were found at necropsy in pigs that were fed 12,800,000 units and 25,600,000 units Hygromycin B per ton of complete feed. Control pigs were found to have many worm parasites.

The effect on Trichuris was noted and data from additional experiments confirming this effect will be published at a later date.

Summary

Crude dried broth of *S. hygroscopicus* containing hygromycin B when administered in the feed to swine, was found to possess anthelmintic effect against Ascaris and Oesophagostomum spp. All medicated feed levels used in this test were equally acceptable to swine and no toxic manifestations of the antibiotic were observed.

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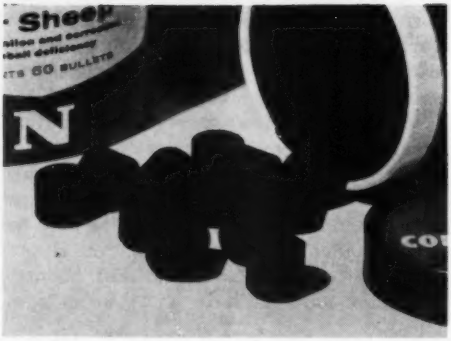
TABLE 2. Weight Gains and Feed Conversions with Hygromix

Crude Dried Broth Medicated Ration	Conc.* in Feed Units/ton	Avg. Initial wt. (7 pigs) lb.	Gain lb.	Av. Daily Gain	Feed Consumed in 5 weeks lb.	Feed Conversion
Control		99	405	1.65	1,470	3.63
S. hygroscopicus	25,600,000	90	487	1.99	1,615	3.52
S. hygroscopicus	12,800,000	124	449	1.83	1,555	3.46
S. hygroscopicus	6,400,000	86	449	1.83	1,535	3.41

*Units of hygromycin B assayed against *B. subtilis*.



Weight of the cobalt bullet keeps it in the reticulum where it provides a continuous supply of cobalt for a year or more.

Sheep raising in difficult cobalt-deficient areas has been revolutionized by a discovery made in Australia. This discovery presents a simple, precise method of supplying cobalt and invokes a new method for administering the supplement.

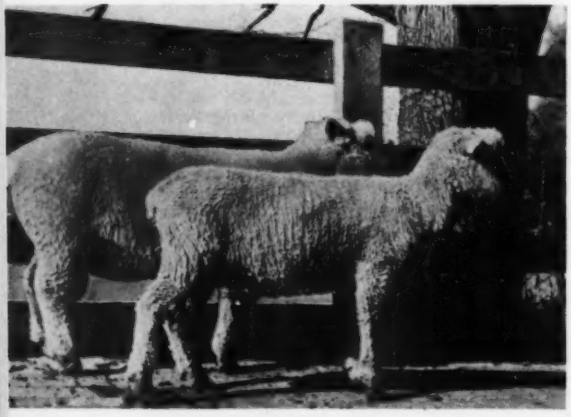
Cobalt Bullets

A NEW AND PEACEFUL "WEAPON" of science known as the cobalt bullet is being introduced in the United States after highly successful experiences in Australia. This new bullet provides sheep with a continuous supply of cobalt, the trace mineral essential for maximum weight gains and wool production. A large number of field trials have proved that one cobalt pellet is retained for a full year or more.

The cobalt bullet comes from the laboratories of Australia's government research agency, Commonwealth Scientific and Industrial Research Organization. Information released by the Australian News and Information Bureau indicates that millions of sheep throughout Australia are now carrying cobalt bullets to protect them against cobalt deficiency.

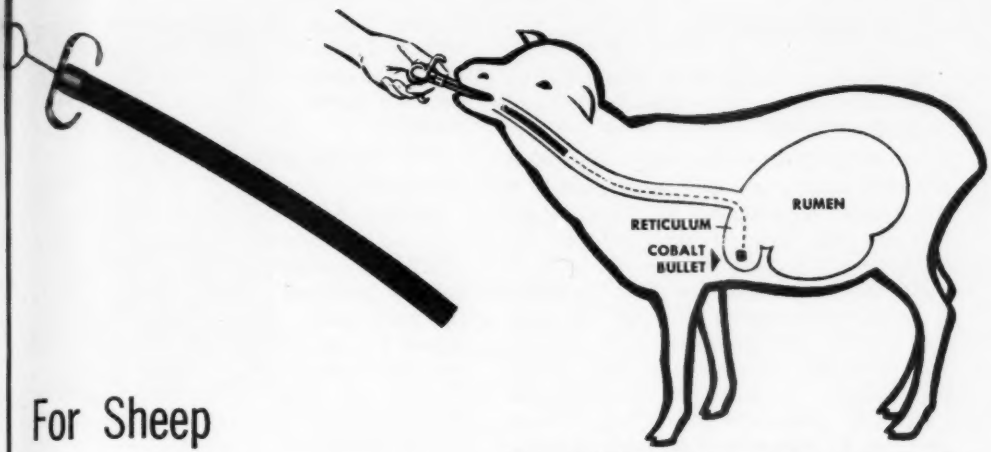
Since original introduction of the bullet, tests have been conducted in borderline and unsuspected-deficient areas. These have proved that the most certain way to determine whether a country is cobalt deficient is by the response of animals to treatment using treated and untreated groups in controlled experiments. One such test in Australia showed the following results: Group A (untreated) average weight 40.9 lb. at commencement; group B (cobalt bullets) 40.4 lb. After 29 weeks sheep in group A averaged 64.7 lb., and those in group B 77.5 lb.

Both sheep are of the same age and from the same flock. The animal in back was dosed with one cobalt bullet; the other received no supplementary cobalt.



Gross Deficiency

In the United States cobalt deficiency was first identified by Neal and Ahmann in Florida cattle and has since been shown to exist in a number of states. Gross cobalt deficiency symptoms are indistinguishable from a number of other conditions including starvation and parasite infection. Autopsy findings of animals which have died from cobalt deficiency are particularly unrevealing. With extreme emaciation there may be edema, perhaps a fatty liver and a hemosiderosed spleen. There are no gross changes which are peculiar to cobalt deficiency. In some other trace element deficiencies nervous reactions are evident, but these have not been observed for cobalt de-



Permaco cobalt bullets are a one dose way to provide sheep with a continuous supply of cobalt. The bullet is deposited down the esophagus by means of an ejector gun; and it lodges in the reticulum where it remains for a year or more to release a daily supply of cobalt.

For Sheep

ficiency. A possible exception is the condition known as phalalaris staggers in which neurological changes occur. Although anemia is characteristic of cobalt deficiency in sheep, there is little direct relationship between the development of the anemia and the acute symptoms of cobalt deficiency.

In less acute conditions the range of reaction to a cobalt deficiency may be from a slight loss in weight with reduced growth rate or a slight listlessness to sudden death with no apparent reason. On borderline deficient pastures ewes often carry lambs to term, but lambs are born in a weakened condition and may live only a few days. In numerous reports it has been noted that more than half the lambs born from cobalt deficient ewes are weak; under these conditions mortality exceeds 90%. Along with high mortality, poor wool quality is a by-product.

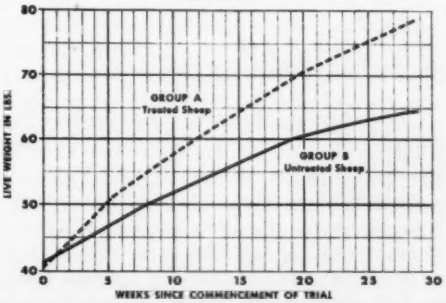
Cobalt Confusion

The confusion which a cobalt deficiency generates is often compounded because of a heavy internal parasite infection. Postmortem examination of animals suffering from cobalt deficiency, but revealing heavy parasite infection, naturally suggests parasitism as the controlling factor. On the other hand, administration of anthelmintics has been ineffective in the treatment of parasitism when cobalt deficiency has subsequently been shown to exist.

The most pronounced feature of cobalt deficiency has been the lack of appetite and differences in weight gain with the various levels of cobalt deficiency which may stem from this appetite failure. A striking example of this has been shown by the workers of New York and New Hampshire who compared cobalt deficient sheep with animals receiving a supplement. Animals receiving the supplement gained approximately seven times as much weight, ate five times as much concentrate and six times as much hay and drank twice as much wtaer.

Cobalt bullets will be supplied in north and south America through Nicholas of America Ltd., and distribution will be through William Cooper and Nephews, Inc.

GRAPH 1



This graph illustrates the difference of 12.8 lb. average individual weight gains of a group of cobalt treated sheep over sheep in the same flock not dosed. These results were obtained in an area not regarded as cobalt deficient.

Bovine Hyperkeratosis

Bovine hyperkeratosis in two different herds in Norway was reported in 1947 and 1953 respectively.

In one of these herds it was evident that the toxic effect must have been caused by some substance present in the cowshed, although this was not identified. In the other herd the cause was proved to be a multipurpose lubricant commonly applied to various machines on the farm. The content of chloronaphthalenes in this lubricant was about 4%, determined as pentachloronaphthalene. Oral administration to calves resulted in typical symtoms of hyperkeratosis. — *J. L. Flatla og M. Aas Hansen, Eighth Nordic Veterinary Congress.*

Overfeeding Sheep with Carbohydrates

Experimental investigations on the effect of overfeeding sheep with carbohydrates have shown that the amount of lactic acid in the rumen content increases, the osmotic pressure rises and the consumption of oxygen and production of carbon dioxide stops. Dehydration of the animal is indicated by the hematocrit values, and lactic acid and pyruvic acid contents of the blood in many instances higher than normal. Immediately before death the blood pyruvic acid content always increased. The urine thiamine content of the sick animals decreased to about one tenth of the normal value. — *Dr. G. Broberg, Eighth Nordic Veterinary Congress.*

Aluminium Compounds

The effect of different aluminium compounds as fluorine alleviators has been tested by feeding experiments on sheep.

Al-hydroxide seems to be of no prophylactic value in the prevention of fluorosis, whereas the use of Al-lactate and Al-sulphate gave promising results. Supplements of Al-lactate administered to animals consuming fluorine-contaminated hay or dosed with NaF, reduced the fluorine output in the urine by 30 to 45%, increased the fluorine content of the feces by more than 40%, and reduced the fluorine concentration of the metacarpal bone by about 30%. Al-sulphate seems to have a corresponding effect.

The experiments are to be continued for some years.

Another experiment lasting several years has just been started in order to ascertain whether a constant supplement of Al-salt has any undesirable effect on sheep. From this preliminary work it seems that large amounts of aluminium tend to depress the inorganic phosphorus concentration of serum. — *Fr. Ender, J. L. Flatla, M. Aas Hansen, S. Ramstad og O. Bjornson, Eighth Nordic Veterinary Congress.*

Harmful Side Effects

Human medical literature has recently reported undesirable side effects following incautious use of newer drugs. It is indicated for example that reserpine, the active principle of Rauwolfia, may be etiologically related to the appearance of peptic ulcers during its use as a hypotensive agent; that those tranquilizers (ataraxics) that are built around the phenothiazine molecule may cause severe liver damage, and sometimes nerve reactions evidenced by tremor, rigidity and drooling. *Broad spectrum* antibiotics destroy so many harmless bacteria in the digestive tract that non-affected remaining harmful organisms may cause upsets such as enteritis. Cortisone-type hormones may stimulate peptic ulcers even to the point of perforation. Sulfa drugs in over dosage or prolonged use destroy leukocytes so that disease resistance may actually be reduced. Isoniazid ($C_6H_7N_3O$) the drug hailed as the best agent in the treatment of tuberculosis may result in pellegra-like symptoms that require prompt vitamin B_6 treatment to prevent permanent derangement. Pregnancy is usually a contraindication for the use of *x*-rays; ACTH or cortisone-like hormones may bring on fetal defects, etc. Though veterinarians are not so much concerned with the side effects it would be well to avoid careless medication.—*R. R. Dykstra, D.V.M.*

The role of money in the average veterinary practice is often understated. Preparation of students to cope with the subtle ramifications of the financial world is inadequate in today's Veterinary college system. Doctor Frick presents a witty and compelling analysis of some problems involved. This report was presented at the 41st annual convention of the Southern Veterinary Medical Association October 26-29, 1958.

Money and the Veterinarian

EDWIN J. FRICK, D.V.M.

School of Veterinary Medicine
Kansas State College
Manhattan, Kansas

MY QUALIFICATIONS to discuss the subject of money are based on the fact that all my life I have tried to get a speaking acquaintance with money and for the last 40 years I have been teaching veterinary students and most of them, because or in spite of any teachings, have done well. Money is very interesting. Money is a medium of exchange. In our type of civilization it becomes a necessity. They say money talks —well it does, but these days you have to increase the volume if you want to get the message, and about the principle message I seem to get is when it says "Good-bye."

The Veterinarian's Investment

Annual student surveys conducted over the last four years at Kansas State reveal that the average cost, considering time and money, of obtaining a D.V.M. degree after high school is about $27,000. Many spend more especially if they have other degrees. When a student graduates he is about at the lowest financial level of his adult life. Frequently he is in debt and many have a wife and children to support. Certainly colleges should teach veterinarians the proper fee to be collected for their services. Ambulatory clinic should also be a special financial discussion shop as to why and what fair professional charges are to be made. If you were a college instructor you would find it difficult to get printed material on which to base charges, since there is entirely too much variation even on basic services performed by the profession. Teaching students to plan a successful professional life also entails proper knowledge of fiscal returns.

The present day young veterinarian has a big investment to consider. He has two years of pre-veterinary college training and four years of professional college work. He must pass a State Board Examination. He has had two years of clinical training and seen from 10 to 30,000 cases treated. He is a well trained laboratory man. He is capable of running antibiotic sensitivity tests, blood counts, taking *x*-rays, etc., but he has little or no sense of the evaluation of things and little business judgment. He is a pro-

fessional man and not a tradesman. He is one who first, last, and always is trying to render service. He is a man dedicated to his profession and yet he must somehow learn to make a good living through his work.

Practitioners in the field may have reason to criticise college instruction regarding the kind or even lack of fee charging taught in the schools, but all too often there has been little or no help to balance the criticism either from the individual or local veterinary association.

To live an intelligent, properly financed, professional life requires sound planning and the colleges should help direct such plans. Few teachers have such qualifications.

Teaching is a profession and a business. It is a nice life. It has fringe benefits, eventually a small pension, annually a month's vacation. It affords an excellent opportunity to develop professionally in a pleasant atmosphere with daily contacts with the best youth of the land. It's mostly a nice life of gentile poverty! I have before me the salary scale of the teachers of all the veterinary colleges in the United States. They average:

Professors	$9,248 to $11,674
Assoc. Prof.	7,612 to 9,434
Asst. Prof.	6,434 to 8,024
Instructors	5,379 to 6,671

The average instructor starts at ARS wages. We expect a picked superior man. In the clinical field he has longer working hours and in other teaching fields he has long study hours, yet we pay no more than any ordinary new graduate gets. How many really good teachers have you had in your school life?

We ask a veterinary instructor to train the minds of the best building material of our profession — our instructor should have exceptional ability to be chosen to shape our future profession. He should be ambitious, keen, aggressive with an attitude and personality to instill enthusiasm and dedication in his students. The teaching profession should have some competition for best development. The importance of education to business and business to education needs to be spotlighted and stressed. Industry pays good salaries especially for ability. A business of national importance comparable to the veterinary profession that could only pay its top executives and best brains $12,000. a year would hardly be considered even a second rate concern. One doesn't expect to go in a store and pick out the best quality product and then offer to pay the price of their lowest product. Usually we get what we pay for.

Financial Judgment

Unfortunately, no course is given in college in financial judgment, and often the new veterinarian finds himself in self-boiled hot water when he graduates and enters the "school of hard knocks." Whether he wants to or not he must study and master economics. Every day he practices and thinks economics. It is woven into his job, his career, the making of a living, the plans for spending and saving, and the decisions about how to get ahead. He buys a rug and holds off on the refrigerator. He shoots the works on a vacation, puts windows in the sleeping porch, or saves for the kid's education. If the veterinarian runs a practice, big or little, he keeps books and figures costs trying to make a little extra over and above expenses. This is the practice of economics—business economics. It is workaday stuff, a tool to be used by individuals, by families, by businesses, and by voters. It is nothing to shy away from.

Money in itself is the poorest form of wealth, yet the things that can be done with it are important. They say you can't take it with you or can't go places without it and that the love of money is the root of evil. A veterinarian should not pay too much for the money he gets, and should not let it cloud the picture of the difference between what is basic and what is base. Money is power; money is a necessity under today's system of living. Things can be done with money that cannot be done without it. Some men intensify their efforts in making money to such a degree that they lose their health and then spend their wealth trying to get their health back. That is a present danger in the one-man practice — too much work. Some men take too much out of their practice. They don't plough any back, such as buying books, magazines, instruments and new equipment and attending

state meetings, etc. Good veterinarians are not financial illiterates, but should have the better things of life and it takes money to do this.

A good veterinarian must develop into a good businessman. As the years pass he has to learn to invest savings wisely, some in real estate, stocks and bonds, insurance, and to scatter wealth, as nothing is entirely safe.

The Insurance Mystery

Let us take a knowledge of insurance. Life insurance is a wonderful thing but it is very much misused. It was never intended for building an estate but to provide an estate if you did not live long enough to build it yourself. There are two kinds of life insurance — term and other kinds. Let me quote from Norman Dacey, a financial consultant.

"When you buy an ordinary life policy, you pay the premium for term insurance plus an extra amount which the company is to put away for you with the understanding that they are to pay it back to you at age 96. The savings account part of the premium is so computed that, on a $1,000. policy, it will have accumulated to $1,000. at age 96. The chances of your reaching 96 are about one in 850,000 — you can probably get better odds than that in the Irish Sweepstakes!

"It is important, then, to understand that the policy provides that if you die before age 96 (even one day before) the company will pay to your beneficiary the face amount of the policy. Included in this face amount is your cash value. Only the difference between the face amount of the policy and the cash value is true insurance. That's the way an 'ordinary life' policy works A 20 payment life policy works the same way, except that the premiums are larger since you must crowd a lifetime of premium payments into the first 20 years. It still pays off the face amount at age 96.

"During the years until age 96, the company will pay you 2½ to 3% interest on your savings account. If you need to use some of that savings account, they'll lend it back to you at 5% or more. If you protest that this is not equitable and tell them you have decided just to take your savings account out, the company will 'punish' you by cancelling the protection entirely! You must take either the loan value or the cash value, and if you choose the latter, they cancel your policy. . . . If you borrow on it, you'll still be saddled with high premium payments as well as the interest. . . . And your insurance will drop by the amount you borrow.

"On the other hand, suppose you carry renewable term insurance instead of ordinary life, and have set aside the money saved on premiums. You can't borrow on your term policy, to be sure. But you can, in an emergency, use your savings — and pay no interest. Your fixed premium payments are much smaller, and your insurance protection is undiminished.

"If you give the insurance company just the term insurance part of the premium and put the rest in a savings bank, by any given date in the future you will have more accumulated in the bank account than you would have in the insurance cash value. The insurance company pays out approximately 15% of the savings account. The bank won't pay anyone for selling you the savings account. Interest will be added to your money — nothing taken from it. After 5, or 55 years you will have more 'cash value' accumulated in the savings bank. If you live, you are better off. But, what if you die? Have you sacrificed something? No. indeed. Your family will have all the insurance and all the money in the savings bank. They'll have both — instead of the insurance company using your savings account/cash value to help pay off the claim. It would appear, than, that by buying term insurance you will be better off if you live, and your family will be better off if you die."

The Cash Estate

So much for insurance. It is a wonderful thing but we should not be blind to its weakness. That still leaves us with the other part of our job of building a cash estate to retire on some day. With the purchasing power of the dollar decreasing an average of 5% a year for the last 15 years, with wages increasing and social welfare the popular belle of the day it seems inevitable that inflation in some form will be the trend of

the future. Diversified material things will be in demand. Natural resources seem an excellent holding especially with the tax situation being a factor in every financial dealing. Stocks especially the diversified mutual funds represent a hedge against inflation and with good professional advice you should know what you are investing in.

Certainly every veterinarian has special abilities. You should learn through trial and error just in what field your best judgment proves out. I've known men to study young growing business and then to invest and reap huge returns. I've also known veterinarians to invest in livestock projects that they understood from cattle feeding to purebred dairy herds, fur farming or pony raising and to multiply their investments. Many students of mine have purchased real estate on the edge of a growing town and with that real estate supporting itself by rental or crop returns to carry taxes and a low rate of interest or enough to carry the mortgage interest have greatly increased their estates in value after a few years of normal population growth and building advancement. To a college graduate with the average veterinarian's contacts with varied walks of life, and the sense of values he should develop from his surroundings and the many people he meets, certainly a little serious thought should allow him to average out a majority of successful financial projects.

The Professional Man

Certainly the value of the veterinarian to his community cannot be judged in dollars alone. A professional man is worthy of his hire. He needs to live properly in order to properly perform his professional duties. Anything less than a good professional living is coupled with failure somewhere. Without a good return, the justification of six years of college training is absurd. Veterinary medicine is tied by one hand to the business of agriculture and by the other to human health. If this link cannot be supported, its importance in the chain of human events bodes ill for the future.

Consider the necessary training needed to qualify for practice, the ever present need to keep up with advancement, and the dangerous, often disagreeable type of intelligent, skilled work involved, not to mention the long hours and the money invested in equipment and buildings. Proper fee charging is somewhat of an art. A three-way test I like to use is to consider "Is the charge fair to the animal, the owner, and myself?" When making a charge, I ask the client, "It that satisfactory?" and any misunderstanding is open at once for explanation. With increasing tax burdens on everything, the rising labor costs and growing inflation in general, it beomes imperative that veterinary fee must increase if the profession is to maintain its place in society. Is it asking too much for a hardworking educated man, especially in the field of practice, where daily work is fraught with danger from accident and disease to be so rewarded as to lead a comfortable life, and to have a decent retirement program? Certainly the people we serve profit immensely by our service. Without our service their costs would be much higher. That leaves us with the natural conclusion that the veterinary profession is largely to blame for not being prosperous. Unless we place a proper higher value on our work and adjust it according to that value we need not complain of loss of prestige or failure to develop with the times. Since 1940 the purchasing power of your dollars has declined 50%. Your own savings and investments are at stake.

If the veterinarian's charges are less than substantial, there should be a re-evaluation, since a profitable fee is the only way he can continue to properly serve his community. Proper savings for future demands are essential for any well planned life. His work should be worthy of his charge and his charge should be worthy of him. It may be fun to die in harness or with your boots on — if you don't have to!

But there is more to life than accumulation of material things. Aside from making a living, the veterinarian should have time for life — belong to a civic club, help organizations, and take an active interest in the welfare of the community. For instance, how natural and easy it would be for him to highlight one of the 4-H Club meetings with some good veterinary advice; work with the Boy and Girl Scout groups to lessen the tragedy of juvenile delinquency;

Continued on page 113

Editorial

A FUNDAMENTAL PROBLEM OF ETHICS

A fundamental problem on which the Veterinary Code of Ethics is passive, if not silent, is driving a wedge from within, and threatens to divide the profession. The members of several state and local associations are in bitter disagreement over the propriety of veterinarians cooperatively owning firms which supply them with pharmaceutical and biological products. During recent weeks the battle has moved beyond the scope of association meetings.

Preliminary skirmishes have been waged over this issue in a public hearing called by the Secretary of Agriculture under the Anti-Hog Cholera Serum and Virus Marketing Order. The urgent issue that concerns the Secretary of Agriculture is to insure maintenancy of an adequate supply of serum and virus by regulation of the marketing of these products, to prevent undue and excessive fluctuations, unfair methods of competition and unfair practices.

The relationship of the veterinary profession to this problem is simply this: can a veterinarian own stock in a firm that supplies the hog cholera products he uses without risk of disrupting orderly marketing of such products.

The controversy that has spilled over state boundaries and is being debated by veterinary groups throughout the country is a flame that can consume the organized profession. Allowed to suppurate, such irritants can weaken and devitalize the professional organizations from within, and by spilling over into public view can wreck the profession from without.

It is unfortunate at this time that the skeleton of professional disagreement had to be dragged from the closet, given a good thrashing in public view, and paraded down the street of undue publicity through the canard of a public hearing. It must soon be returned to the closet by the profession.

The issue obviously calls for carefully considered action, but prompt cessation of partisan mud slinging and restoration of working harmony certainly hold a far higher priority on the agenda of professional problems.

In the interest of professional unity it seems appropriate that an independent review of the pertinent facts be presented. Indicated action through established representative machinery of local and state and national association can clearly define ethical codes in a manner that will cover this development without prolonged emotional debate.

The question for professional decision, simply stated, is: does veterinary ownership of firms supplying their drug and biological needs jeopardize the respect and integrity of organized veterinary medicine or the service rendered the livestock industry. As veterinarians we should not allow personal interests or social opinions of the general cooperative movement cloud basic thinking on the matter of professional conduct.

Against Ownership

The case against ownership has been stated, briefly and succintly, by Dr. A. G. Misener, a practitioner from Chicago:

"The fact that the veterinarian may never

allow his personal interests to interfere with his professional duties is of no importance. It is the tendency which such a conflict of interests creates which is an inducement to contravention of public policy.

"Anything which tends to debase the learned professions is a public evil. These professions, as they exist in our social structure, rest upon a foundation of sturdy, sterling human character which, in turn, has been and is being shaped and moulded by the traditional ideals and points of view. The licensing statutes, with their emphasis on character and professional conduct, evidence a fixed public desire not only to foster, but to develop and reinforce these basic attributes of its professional servants.

"The constant trend of public demand is for mounting standards, a more painstaking investigation of the character and professional conduct of applicants for entrance into these regulated fields, and a more constant vigilance in observing the conduct of those to whom the privilege of practice has been granted.

"Following this trend, several states have adopted legislations making it unlawful for any person licensed by the State to practice medicine and surgery or dentistry to request, receive or allow, directly or indirectly, any rebate, refund, commission, or profit from any person, firm, corporation or association, whether organized as a cooperative, or for profit or non-profit, in connection with the furnishing of medical, surgical or dental care, diagnosis, treatment or service, or the sale, rental, furnishing or supplying of any goods, services or supplies prescribed for medical diagnosis, care or treatment.

"Many other professions, businesses and industries are voluntarily adopting the same principle. For example, we find that the Association of Advertising Agencies provides in its by-laws that no applicant agency shall be deemed worthy of election whose owners or executives are interested in other business supplying material to its clients, in any way or to any degree which might disqualify the agency from giving unbiased advice and service to advertisers.

"Among the Principles of Medical Ethics of the American Medical Association, Chapter 1, Section 9, is the following: "The acceptance of rebates on prescriptions and appliances or of commissions from those who aid in the care of patients is unethical."

For Ownership

As president of the veterinary-owned cooperative, Diamond Laboratories, Dr. H. Edward Hanna, Springville, Iowa, expressed the views of his membership as follows:

"Whether a veterinarian prescribes a product manufactured by a company in which he has invested, or a product out of his inventory in which he has invested, the ethical problem is the same. Manufacturers today offer discounts and price adjustments which could influence veterinarians in their choice of prescriptions. The veterinarian maintains a substantial inventory out of which he dispenses at a profit. Drug houses seek his purchases and even furnish promotional literature on how he may increase his earnings from his inventory investment. Having stocked any particular products, the veterinarian has an interest in their sale and in a return for his investment. That interest is no different from the interest of a Diamond member in a return on his investment in the company. Whatever economic motive a member might have to prescribe Diamond products, every veterinarian has to prescribe the products in which he has put his money. But veterinarians have not allowed economic motives to influence their choice of remedies.

"Choosing the proper remedy for the animal without regard to selfish motives is the fundamental ethical principle. The circumstances under which this principle could be violated are so numerous that it would be impossible to legislate against them. Though we cannot eliminate the temptation by recognizing the principle we can discipline those who succumb to temptation.

"At the same time, in the vast majority of cases, the choice of a particular brand is not significant in treatment. In these circumstances the veterinarian should be as free as any other citizen to have a return on his investment, whether in his inventory or in his company; for his investment helps make possible the protection of his client's animals. Indeed, the veterinarian may improve the quality of his professional service

by the close contact which his investment in his company affords him with his supplier. And what could be more natural for a veterinarian than to invest in a business which he understands?

"The Principles of Ethics of the American Medical Association permit the physician to supply drugs, remedies, or appliances so long as there is no exploitation of the patient. A group of physicians owning their own office building may ethically own or operate a drug store in the building, the Medical Association Judicial Council has ruled. If physicians, dealing with human lives, may properly profit from the making and sale of medical supplies, surely veterinarians should be free to profit from the making and dispensing of animal remedies."

Editorial Policy

VETERINARY MEDICINE since it's inception has functioned more or less as an open forum with ethical restrictions. Anyone qualified to have an opinion may be given space to present his opinion exactly as he would be extended the speaker's platform at his professional assemblies. The definition of the problem and selected partisan opinions presented here are intended to stimulate professional thought. Reader opinions are invited by the editor. A future issue will present a ready discussion of the problem. Approval by the author of letters bearing his signature will be observed.

Calves On Milk Have Fewer Worms

Continuous milk in calves' diets may help to avoid early treatment for stomach and intestinal worms. Evidence from several scientific sources indicate that milk discourages development of parasites in the digestive tract.

USDA scientists at Auburn, Alabama have found that calves on milk harbored fewer of several common kinds of worms. In one test they compared calves weaned at 12 to 16 months of age. They infected all with large stomach worm larvae. A month later, the milk-fed calves had gained better and had fewer worms when killed.

In another test, researchers made a similar comparison of calves fed grain, hay, and milk with calves fed milk alone. Calves fed nothing but milk had smaller and far fewer worms, but their diet prevented them from gaining as well as the others.

To learn about worm infections acquired naturally by grazing, the scientists compared two groups of calves on pasture; one group received milk twice a day. At slaughter both groups had about the same number of stomach worms, but calves on milk had fewer intestinal worms.

Researchers have no definite explanation for milk's effect on parasites.

MONEY AND THE VETERINARIAN

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and from the standpoint of public health, take an active interest in making the food and milk inspection and sanitary precautions adequate in his home town, realizing that he, with his inside knowledge can render a valuable public service. A veterinarian might ask himself whether he carries any weight with his Chamber of Commerce or civic clubs or whether he is just a hitchhiker. What a man does for himself dies with him; what a man does for his community lives after him!

And last, let's take the spiritual aspect of veterinary medicine. If anyone thinks that administering to the relief of a dumb brute's suffering has no spiritual rewards, then I pity his blindness. A real veterinarian knows the reward that he receives whenever he successfully corrects some condition that would otherwise have meant disaster.

Our work is often dirty and dangerous, but most interesting. I only hope that every veterinarian can be some day crowned with the three-way reward: satisfaction and compensation from the owner, gratitude from the patient, and the inner feeling of elation that comes from having performed a deed well.

Animal Health

R. R. DYKSTRA, D.V.M.

Hepatogenic Photosensitization

Reports are again being received from certain sections of the Midwest, of a peculiar skin anomaly in cattle. Outstanding symptoms are exfoliation of extensive areas of the light colored portion of the skin and at times the muzzle, and the mammary region. Research in at least one station appears to indicate that the condition most frequently follows consumption of first cutting alfalfa hay, the latter having in it some Johnson grass, vetch, oats, and other grasses. The disease is alleged to have been produced experimentally without the isolation of any specific factor. Mold, bacteria and plant toxins have been suggested as causative. A tentative diagnosis of hepatogenic photosensitization has been suggested by some observers, suggesting a liver involvement.

The writer saw many cases of a similar condition some 15 or 20 years ago in Kansas. Experiment to produce the condition failed. The usual advice given then was to keep animals with light colored skin or light colored skin areas out of exposure to direct sunlight, and to change the feed. Locally demulcents and other soothing agents were applied to affected areas.

The Glycerin Treatment

It may be of interest to veterinarians that some physicians successfully remove, head and all, tapeworms from the human digestive tract by the glycerin treatment. This is based on the fact that glycerin, or a saline solution, at a temperature of 130 to 140 F. is toxic in five minutes or less to tapeworms immersed in it. To apply the treatment a tube is passed by way of the mouth, through the stomach and into the duodenum — the latter when the patient is on the right side.

It is determined fluoroscopically that the tube is well into the third or fourth portion of the duodenum. Then immediately 1½ oz. of a saturated magnisium sulphate solution are injected. This is followed with 1½ oz. glycerin; immediately after the glycerin, 2 oz. of a mixture of equal parts of glycerin and magnesium sulphate (the latter in a saturated solution) are injected. This is again immediately followed by an injection of 500 cc. of the sterile saline solution heated 54 to 60 F. or 130 to 140 F. In 10 to 15 minutes in a total of 31 out of 40 patients treated the entire tapeworm with head and all attached scolices are passed. It is customary to have the parasite pass into a convenient bucket containing warm water or a saline solution in order to determine whether the head has been passed. The only observed undesirable effects on the patient is slight tachycardia in some cases, and the somewhat disagreeable intubation. The patient was ready to leave very shortly after passage of the tape. (For more detailed information, consult page 2065 of the August 23, 1958 *Journal of the American Medical Association.*)

Ultrasound

Ultrasound in the handling of certain conditions in animals has recently been introduced. It seems to be of some value in ailments for which deep heat is indicated. Ultrasound should not be used over the stellate ganglia or the heart since it may result in irregular rhythm, nor over the gonads, pregnant uterus, and the large nerve plexuses. In young animals its use over the epiphyses of bones is contraindicated as well as over neoplastic areas. Some of those having experience in the use of this comparatively new measure advise against its use for a period of six months following *x*-ray treatment. With the foregoing exceptions ultrasound seems to have empirical value in the handling of localized pain and spasm, and in the treatment of cicatrisial tissue contractions.

Nutrition

MORRIS ERDHEIM, D.V.M.

Amino Acid in Feeds

The first limiting amino acid in most feeds is methionine. The second is lysine. This means that when most commonly used feed ingredients are compounded into a feed, there may be a shortage of methionine. In order to supply adequate amounts of this amino acid from these natural feedstuffs, a little more protein than is essential is mixed in the feed. Synthetic sources are sometimes added to make up the deficiency. However, the high cost of these synthetic amino acids prevent their use on a large scale in commercial feed manufacture.

A recent production break-through by the chemical industry has permitted the lowering of price of methionine. Methionine hydroxy analogue, which can be used on a pound for pound replacement with dlmethionine for all practical purposes, is now available to the feed industry for a little over $1.50 a pound. This compares with almost twice that much charged until now for methionine.

Undoubtedly, a greater interest in a more general use of this amino acid can be expected. It may be that with the use of relatively small amounts of methionine in the feed, it will be possible to lower the general protein level somewhat without hurting performance.

Increased use of the product may permit the lowering of the price even further — encouraging even greater use. This is an example of the American way.

Milk Fat in Calf Diarrhea

Milk fat has a definite beneficial effect in the control of diarrhea in calves, according to a report by Owen *et. al.*, in the May 1958 issue of the *Journal of Dairy Science*. These Iowa State College workers tested fat, lactose, minerals, and curd formation for effect on the incidence of diarrhea in calves.

Milk fat fed at the 3% level reduced the incidence and severity of diarrhea. Diarrhea was increased when the mineral content was increased to four times the normal level. Doubling the lactose level also increased severity of diarrhea. Prevention of curd formation had no apparent effect on severity of diarrhea.

Whey milk fat is beneficial; what portion of the fat is involved, and whether other fats would be as effective are questions which remain to be answered. For now, it is of interest to know that tests conducted by the Iowa nutritionists confirm what has been reported previously. They suggest to the veterinarian a line of investigation and treatment for diarrhea in calves on skim milk diets.

Enzymes as Feed Additives

For a while, feed additives consisted largely of medicaments. The list included antibiotics, arsenicals, wormers, etc. More recently, the trend has switched and the emphasis now is on products which might be classified as "physiological."

This trend was undoubtedly affected by Catron's reports on the possible use of pepsin in baby pig diets. He noted in 1956 that pigs under five weeks of age produce insufficient quantities or proteolytic enzymes to permit them to utilize solid food containing protein from vegetable sources. The addition of pepsin to such diets permitted the pigs to grow almost as well as on diets made with milk protein.

This development encouraged others to work with enzymes. In 1957 McGinnis of Washington State reported that the addition of amylase to poultry feeds containing barley improved their utilization to a level almost as high as a corn based feed. This work substantiated similar observations made by Fritz and co-workers at Dawe's Laboratories.

The specific mode of action is yet not clear. This much is known. When the amylase (DaweNzyme — Dawe's Labora-

tories) is added to the feed, the barley is improved as an ingredient for poultry. A similar effect can be obtained by soaking the barley in water prior to feeding it.

Whatever the mode of action of the amylase treated barley, it doesn't seem to happen in vitro. It happens in the gut, after the treated feed has been ingested. An interesting side note is the apparent effect on wet litter. Where wet litter seems to be a problem, feeds made with amylase treated barley seem to dry up the droppings. Catron had observed a similar effect of the pepsin treated feeds on pig scours.

The beneficial effect of the amylase addition varies with the grain used. Generally speaking, the most consistent response occurs when barley is used. Some response is seen in some tests on samples of corn, oats and wheat middlings. Some barley samples show more consistent response than others. The barley produced in the Pacific northwest usually shows a marked response to amylase treatment.

Tests just concluded at the Dawe's Nutrition Research Unit by Fritz and coworkers indicated that amylases which have been so effective in barley feeds fed to poultry may have practical application in hog feeding.

Two tests have been completed. In both tests, the animals used were cross-bred gilts. They were distributed into two groups of seven each as uniformly as possible. The rations used were (a) based chiefly on yellow corn, with and without enzyme, and (b) based on oats and wheat middlings with and without enzyme.

The appropriate starter was fed for a five week period. Weight gains and feed conversion results are summarized in table 1.

TABLE 1.

	16% Corn-Based Starter		16% Oats & Middlings Starter	
	Without Enzyme	5 lb. DaweN-zyme per Ton	Without Enzyme	5 lb. DaweN-zyme per Ton
Average daily gain (lb.) (both tests	0.99	1.07	0.88	0.90
lb. feed per 100 lb. gain	306	295	321	296

Much more work will need to be done to determine the possible use of amylolytic enzymes in hog feeds. However, based on information now available, it looks like they may improve feed efficiency. In the two tests reported above, there was no scouring in any of the pigs. Therefore, no observations were made on the effect of the enzyme on diarrhea.

Because of the interesting results with enzymes in poultry and hog feeding, studies are under way to see whether or not amylases have a place in ruminant feeding. Results in artificial rumens haven't been too encouraging, however, actual feeding trials look promising.

Six Million Dairy Cows Now Bred Artificially

The number of dairy cows bred artificially from sires that have demonstrated superior breeding qualities is continuing to rise each year. More than one-fourth of United States dairy cows are so bred at present.

A roundup by the USDA of reports submitted by State Extension dairymen show that over 6 million dairy cows were bred artificially in 1957. In numbers, Wisconsin was the leading state with over a million, and then came New York and Pennsylvania with a little less than half a million each.

Percentage-wise, states with far fewer dairy cows made an even better showing. Maine ranked first, then Utah and Massachusetts. Nearly 50% of the cows bred in these states during 1957 were bred artificially.

Sires used for artificial breeding are proved on the basis of their ability to pass along a capacity for high milk production. Proved sires used in artificial studs in 1956 were mated to dams that averaged 10,626 pounds of milk. Offspring averaged 11,304 pounds of milk.—*Farmers Digest*, October 1958.

Books reviewed in this department and any other books, if available, may be obtained by remitting published price to the Book Department, VETERINARY MEDICINE, Suite 803 Livestock Exchange Building, Kansas City 2, Missouri.

Practitioner's Bookshelf

LEPTOSPIROSIS, by *J. M. Alston* and *J. C. Broom;* 365 pages, E. S. Livingstone Ltd., Publisher, 1958. Price — $8.50. The Williams & Wilkins Company, Baltimore, exclusive U.S. agents.

As an historical sequence, this book is a comprehensive review of what is known about leptospires and the diseases which they cause in man and animals. The book also shows where new knowledge is being gained. Information covers the complete epidemiology, clinical and pathological descriptions of the disease, therapeutics and prevention of infection. An extensive reference section is evidence of the great wealth of world literature this book consolidates.

VETERINARY PROTOZOOLOGY, by *U. F. Richardson* and *S. B. Kendall;* 260 pages, 34 illustrations, second enlarged edition. Oliver and Boyd, publisher, 1957. MacMillan Company, New York, N. Y., distributer. Price — $4.50.

This new edition of *Veterinary Protozoology* has been written to be of use for degree students, post-graduate students of tropical veterinary medicine, and as a field handbook. The text is a synthesis of the authors' experience both in the laboratory and in the field, in temperate as well as in tropical countries.

For easy reference each disease is considered under the heads of Morphology, Distribution and Transmission; Species Susceptible; Symptoms and Pathogenicity; Diagnosis, Treatment and Control. The section on chemotherapy presents detailed information on the chemistry, pharmacology and practical use of all the important drugs. This section covers the most recent research in the field of chemotherapeutic control of epidemic disease.

DIAGNOSTIC AIDS IN THE PRACTICE OF VETERINARY MEDICINE, by *H. H. Berrier;* 85 pages, C. W. Alban & Company, St. Louis, Missouri, Publisher, 1958. Price — $3.75.

Based on material from the course in clinical pathology, School of Veterinary Medicine, University of Missouri, Doctor Berrier has filled the need for a handy and concise source of information on the most practical and simplified field laboratory procedures. Veterinarians everywhere recognize that a broad and detailed knowledge of clinical laboratory work is indispensable to a good practice. This book pinpoints three things the practitioner must know about every laboratory procedure he expects to use, namely, when to use it, how to interpret the results, and what technical or physiological limitations must be considered in the interpretations.

Sources of material and equipment required are conveniently listed along with useful books and charts for the veterinarian interested in starting a clinical laboratory. Information is organized for convenience

Continued on page 121

Blue Tongue

Blue tongue of sheep has been demonstrated biologically in flocks in a dozen or more western sheep-raising states. At this time there is no clear cut serological test to determine its presence. The only reasonably accurate method of determining presence of the disease is as follows: When the disease is suspected, inoculation of susceptable sheep is indicated. A white-faced non-pigmented hoofed animal is the most desirable for testing purposes. The suspected blood specimen (4 ml.) is injected subcutaneously or intravenously. Pre-inoculation and post-inoculation temperatures are taken twice daily for two weeks.

If virus is present a reaction appears approximately one week later. Usual bluetongue signs such as temperature elevation, ptyalism, swelling of lips, nasal discharge, and bursal mucosa extending outwardly to the commissures of the lips. Respiratory difficulty and general lassitude have also been observed, though symptoms in research animals are usually less severe than in field cases.

In the United States two strains of virus have been isolated, but fortunately these are immunologically identical so that a vaccine from one protects against either. Blood samples intended for testing purposes should be taken from animals during the active febrile stage. Later, when clinical signs are visibly present, the animal is probably at least partially immune. The virus up to this date has not been isolated from cattle.
—R. R. Dykstra, D.V.M.

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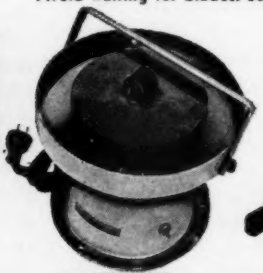

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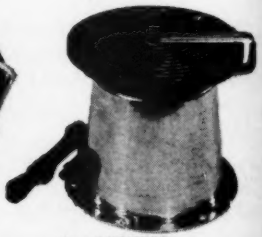

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Veterinarians Rate High

Veterinarians and veterinary service are rating high on farm programs of most radio stations, according to the finding of a nationwide survey conducted for Associated Veterinary Laboratories, as part of its continuing public relations campaign for the profession.

Radio broadcast material on animal health problems is furnished to these radio stations throughout the year by A.V.L. through its educational bureau, the American Foundation for Animal Health. This radio copy not only points out animal disease hazards, but also stresses the importance of calling the veterinarian.

Fractioner's Bookshelf

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under the headings of Hematology Field Tests, Liver Function Field Tests, Pancreatic Function Field Tests, Pituitary and Hypothalmic Function Field Tests, Kidney Function Field Tests, Bacteriology, Stains Dyes and Solutions, Toxicology, Additional Laboratory Equipment.

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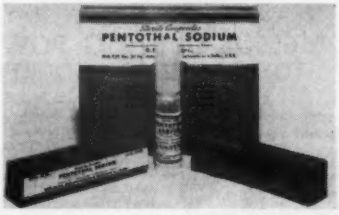

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Roy R. Conner, veterinary marketing manager of Schering Corporation, died December 21 at his home in Glen Rock, New Jersey. He was 39 years of age.

Roy R. Conner

He had been with Schering since the company first formed a veterinary marketing department in 1954. He had been manager of the operation since its inception and under his direction it had grown to be one of the leading ethical veterinary drug lines in the country.

He was President of the American Veterinary Exhibitor's Association and a member of the American Animal Health Pharmaceutical Association.

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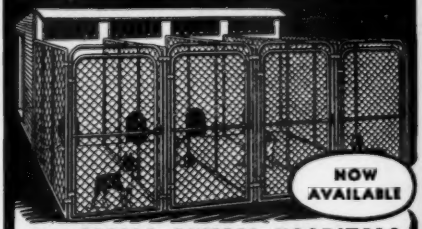

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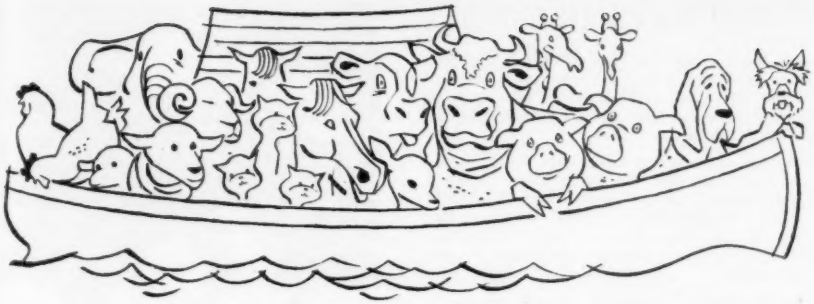

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DARIBIOTIC Injectable—for prompt treatment of bacterial infections.
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*U.S. Patent No. 2,565,057

1. Barr, F.S., Carman, P.E. and Harris, J.R.: Synergism and Antagonism in Antibiotic Combinations; Antibiotics and Chemotherapy; 4:818 (1954).
2. Baker, W.L.: Clinical Use of Injectable Neomycin and Polymyxin B; Veterinary Medicine, 53 (1959): 275.
3. Barr, F.S., Harris, J.R. and Carman, P.E.: Intramuscular Treatment of Staphylococcic Mastitis with Neomycin Sulfate and Polymyxin B Sulfate; J.A.V.M.A., 132 (1958): 110.

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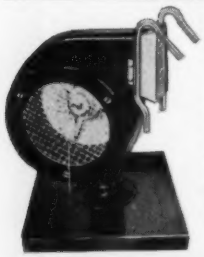

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Powerful and rugged three-heat hot air blower. Delivers 140 cubic feet of either hot, warm, or cold air per minute.

Not heavy or bulky. Will hang anywhere on the cage or may be used any place with the small stand applied. A time saver for professional dog grooming and bathing.

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Fort Dodge Names Executives

D. A. Peterson has been elected president and chief executive officer of Fort Dodge Laboratories, Inc., effective January 1. Guy H. Williams, Jr., has been appointed general sales manager.

Dr. B. J. Gray, former president of the company, has been advanced to the position of assistant to the president of Wyeth Laboratories in Radnor, Pennsylvania.

Peterson began his career with Fort Dodge Laboratories in 1935 as a secretary. Later, he successively became manager of the shipping department and purchasing agent. In 1948 he joined the sales department as a representative in the Cedar Rapids, Iowa territory, and in 1955 was named general sales manager.

Williams joined the company in September 1958 as an assistant sales manager. He came to Fort Dodge from Phoenix, Arizona, where he had been engaged in the field warehousing business. Prior to that he spent a number of years in the veterinary biological and pharmaceutical business.

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If the livestock raiser is to become successful he's got to depend upon the experienced services of the graduate licensed veterinarian. That throws a lot of responsibility on YOU.

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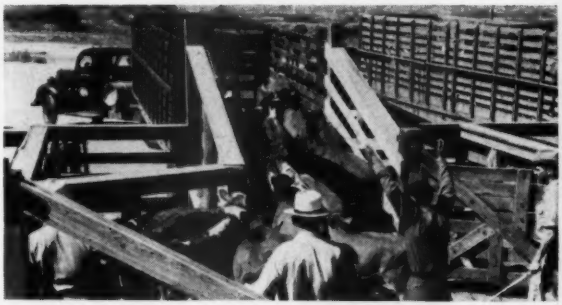
Cut weight loss in shipping cattle... *from range to feed lot*

Injection Sparine®

HYDROCHLORIDE

Promazine Hydrochloride, Wyeth

SPARINE has been established as the ataractic agent of choice in many areas of both large and small animal practice. It has long been used as preoperative medication, and it also facilitates branding, dehorning and castration. Recent tests have shown that SPARINE is indicated in yet another area of large animal practice. Given intramuscularly to cattle prior to shipment, SPARINE reduced markedly the weight losses caused by the rigors of shipping.



INJECTION SPARINE reduces weight losses by controlling the tension, nervousness and unruliness associated with handling, loading and shipping. SPARINE-treated cattle remained steady on their feet even in transit *without impairment of consciousness.*

The table below shows the results following the use of INJECTION SPARINE in reducing shipping-weight losses. In these studies, veterinarians supervised the truck shipment of 56 untreated and 261 SPARINE-treated animals from a range in Oklahoma to a Colorado feed lot—an 18-hour trip. Cattle were weighed immediately prior to shipment and immediately upon arrival at the feed lot. Veterinarians observed that the SPARINE-treated animals were easier to handle, and began to feed more readily because they settled down without milling, fence walking and bawling.

ANIMALS SHIPPED 18 HOURS BY TRUCK	No. of cattle	Av. wt. prior to shipping	Av. wt. upon arrival	Av. lbs. lost	% of shrink
Untreated	30	345.5	325.89	19.8	5.6
	26	434.7	405	29.6	6.89
Treated with SPARINE, ½ mgm. /lb. body weight	73	349.6	340.25	9.25	2.6
	39	350.05	340	10.1	2.9
	4	488.25	467.5	21.25	4.3
	27	464	448	15.7	3.4
	59	447.3	434	13.5	3.01
	59	446.65	433.3	13.3	3.04

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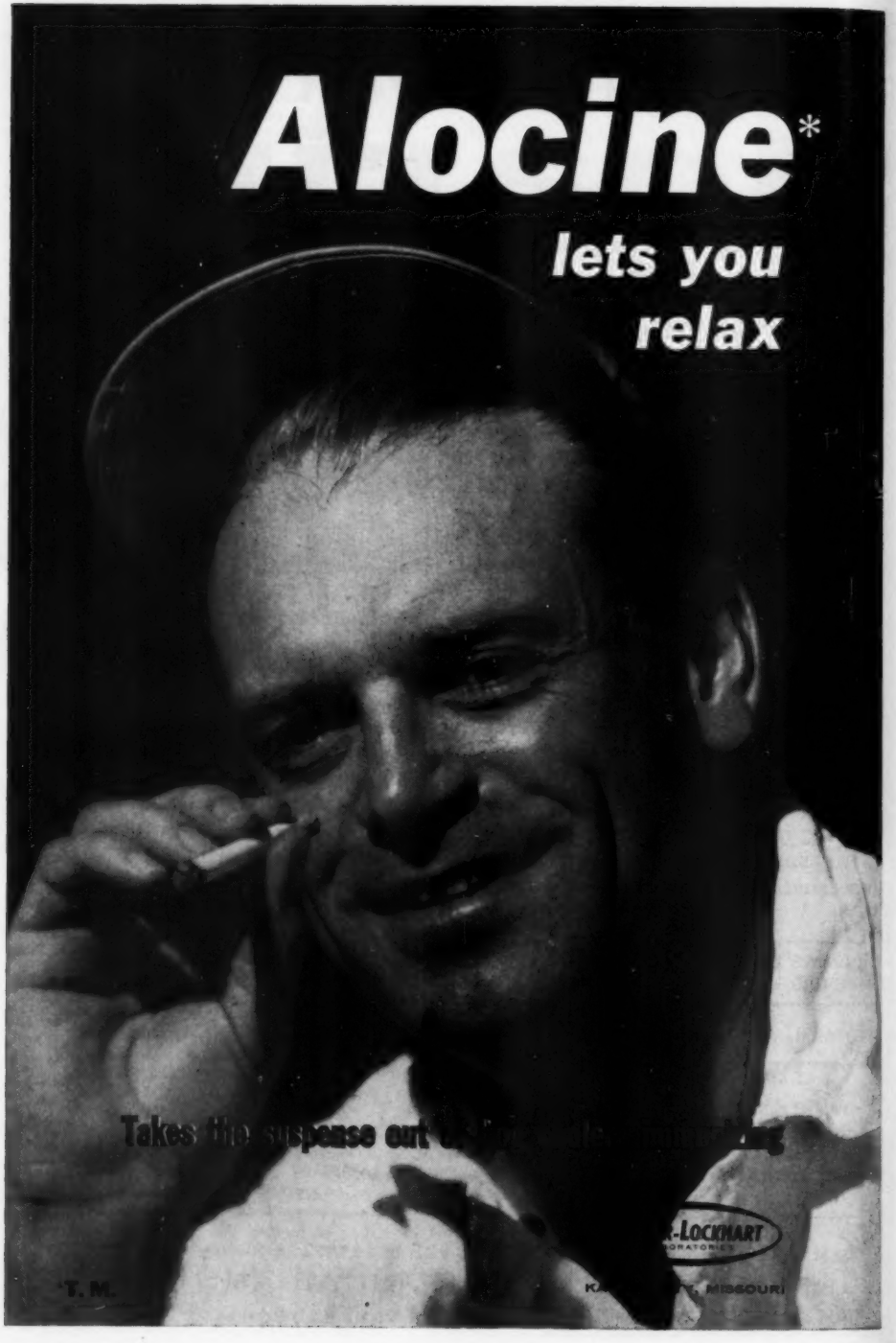
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lets you
relax
Takes the suspense out
T. M.

Veterinary Calendar

Jan. 25-27. **Oklahoma Veterinary Medical Association.** Annual Meeting. Hotel Mayo, Tulsa, Oklahoma. M. N. Riemonschneider, 122 State Capitol Building, Oklahoma City, Oklahoma, secretary.

Jan. 26-28. **Minnesota State Veterinary Medical Society,** annual meeting. Leamington Hotel, Minneapolis, Minn. Dr. B. S. Pomeroy, secretary-treasurer.

Jan. 27-28. **Maryland State Veterinary Medical Association.** Winter Meeting. Emerson Hotel, Baltimore, Maryland. Dr. Harry L. Schultz Jr., Baltimore, Md., secretary.

Jan. 28-29. **North Carolina State College Veterinary Conference,** North Carolina State College, Raleigh, North Carolina. Dr. Edward G. Batte, head, Veterinary Section.

Feb. 2-4. **California Veterinary Medical Association,** annual Midwinter Conference. School of Veterinary Medicine, University of California, Davis.

Feb. 8-9. **West Virginia Veterinary Medical Association,** winter meeting. Greenbrier Hotel, White Sulphur Springs, West Virginia. Dr. Harry J. Fallon, 200 Fifth Street West, Huntington West Virginia, secretary.

Feb. 14-15. **Short Course in Bull Evaluation.** Glover Veterinary Hospital, College of Veterinary Medicine, Colorado State University, Fort Collins, Colorado. Dr. O. R. Adams, chairman.

Feb. 16-18. **Colorado State University,** 20th annual conference for Veterinarians. Glover Veterinary Hospital, College of Veterinary Medicine, Colorado State University, Fort Collins, Colorado. Dr. O. R. Adams, chairman.

Feb. 16-18. **Illinois State Veterinary Medical Association,** annual meeting. LaSalle Hotel, Chicago, Ill. Dr. C. B. Hostetler, 1385 Whitcomb Avenue, Des Plaines, Ill., executive secretary.

Feb. 25. **Nutrition Conference for Veterinarians.** Public Health Building, Indianapolis, Indiana. (Jointly sponsored by the Indiana Veterinary Medical Association and Vita Vet Laboratories, Marion, Indiana.) Dr. J. M. Carter, 3421 S. Main Street, Elkhart, Indiana, chairman.

Feb. 26-28. **Missouri Veterinary Medical Association,** annual meeting. Hotel Statler, St. Louis, Missouri. Dr. Paul L. Spencer, P. O. Box 283, Jefferson City, Missouri, secretary.

Mar. 2-6. **Laboratory Diagnostic Methods in Veterinary Mycology,** short course. Communicable Disease Center, Public Health Service, Chamblee, Georgia. Dr. William Kaplan, Mycology Unit., Department of Health, Education and Welfare, P. O. Box 185, Chamblee, Georgia.

Mar. 15-17. **Alabama Veterinary Medical Association.** Annual Meeting. Houston Hotel, Dothan, Alabama. Dr. M. K. Heath, Auburn, Alabama, secretary-treasurer.

Apr. 13-14. **Oklahoma Conference for Veterinarians,** College of Veterinary Medicine, Oklahoma State University, Veterinary Medical Center. Dr. John H. Venable, chairman.

May 7-9. **American Animal Hospital Association.** Annual Meeting. Municipal Auditorium, Colorado Springs, Colorado. Dr. Wayne H. Riser, 5335 Touhy Avenue, Skokie, Illinois, executive secretary.

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CREMATORY DESTRUCTOR
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Engineered special for the Veterinary Practitioner

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Wet and dry cage papers, amputations, feces, entrails, garbage.
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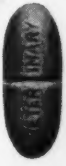

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1. Belloff, G. B.: Calif. Vet. 9:27 (Sept.-Oct.) 1956. 2. Mosier, J. E.: Vet. Med. 52:445 (Sept.) 1957.

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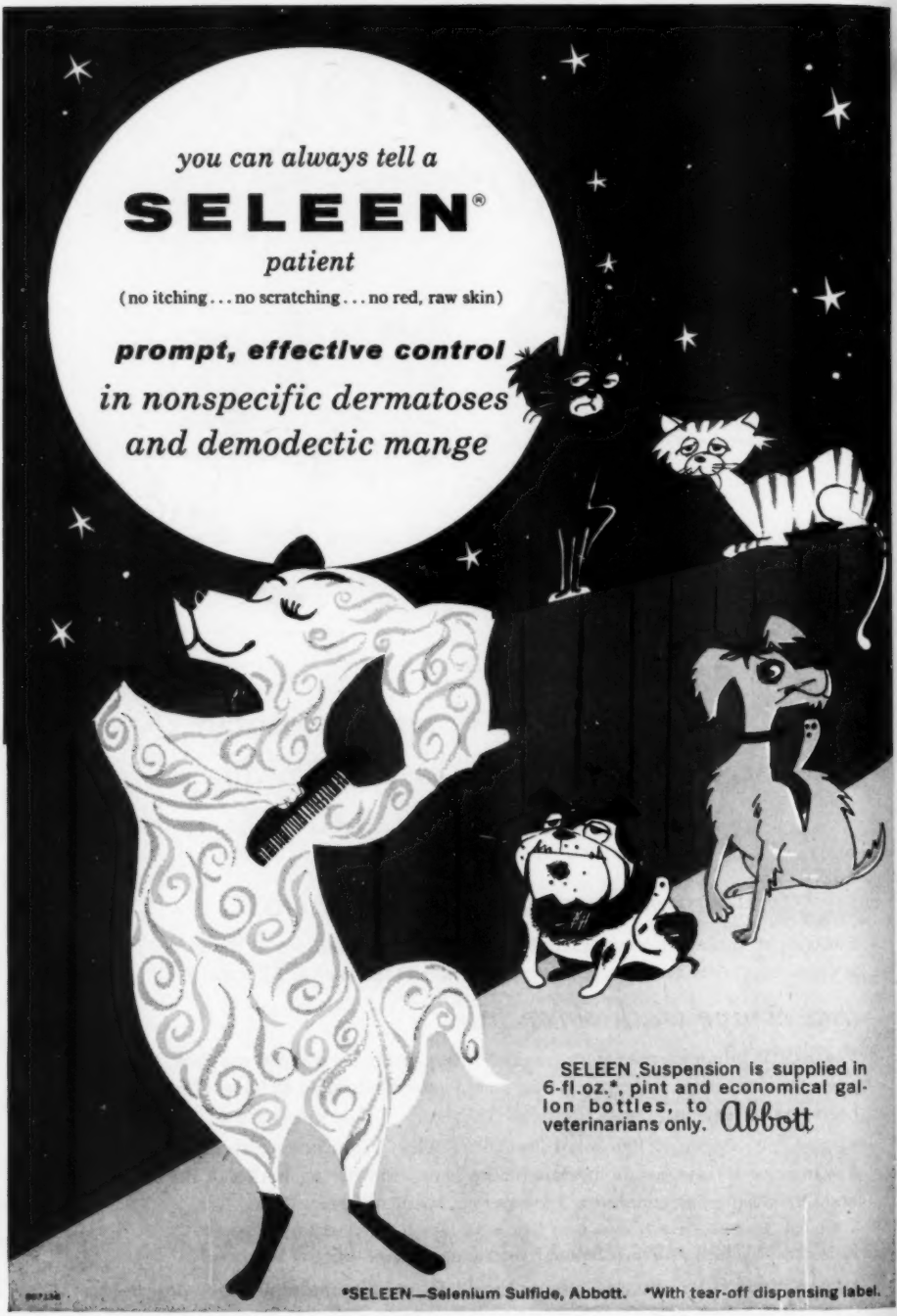
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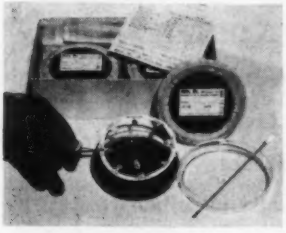
Medikit is a new test for antibacterial sensitivity, and uses the principle that discharges from infected animals contain infective organisms in practically pure cultures. Medikit enables the practitioner to test bacterial sensitivity in his office. It helps him pick an antibacterial agent which



Media, Inc.

is effective *in vitro*, thus avoiding guesswork. It also helps minimize the emergence of resistant organisms. After inoculation with swab, sterile forceps are used to place antibacterial ring on blood agar plate. Following this step, Medikit plate is sealed and allowed to incubate for 12 to 24 hours. If bacteria is sensitive *in vitro* to one of the eight agents on the ring, a clear area will be observed around the antibacterial. For full details and information, check with Media, Inc., 89 Lincoln Park, Newark 2, New Jersey.

A Single-Dose Squeeze-Type Dispenser characterizes the latest package for Furacin Solution Veterinary (Eaton) used in treating bovine mastitis and intra-uterine infections. The polyethylene syringe collapses in accordion-like fashion when pressure is

Eaton Laboratories

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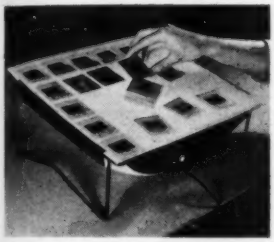
A new vaccine under the name Trioid is being produced for **Immunization Against Distemper,** infectious hepatitis and leptospirosis in dogs. This vaccine combines a chemically inactivated canine distemper virus with an inactivated broth culture of *Leptospira canicola.* The vaccine is desiccated to insure full retention of the antigenic properties of the various components. For information write Fromm Laboratories, Grafton, Wisconsin.

The Slide Sorter permits quick viewing of up to 40 35 mm. slides at a time for quick identification and selection. It facilitates the arrangement of slides in any order or continuity desired for screen presentation at



H. E. Geist Co.

professional meetings. Unit consists of a smooth, unbreakable, translucent, plastic surface mounted on a sturdy, baked enameled, steel stand. For sales prices, write H. E. Geist Co., 8620 Lorain Avenue, Cleveland 2, Ohio.

A new tool for **Marking Rejected Animals** — a paint hammer — is a potential device for use in market inspection and veterinary practice. Application of paint by means of the paint hammer makes a plain and long lasting impression. A paint hammer mark lasts for approximately ten days. For full information, check with Olney and Berrall, 808 North Third St., Milwaukee 3, Wisconsin. The tool has been tested by Canadian groups and found to be satisfactory for slaughtering, inspection, and veterinary practice.

An EDGE on them all

Cutting efficiency and maximum blade performance has always been the surgeon's first consideration when choosing a surgical blade. BARD-PARKER offers you a blade made with the same consideration in mind . . . a blade of carbon steel of course . . . so superior for fine cutting edges.

B-P RIB-BACK Blades are now available...

in the Puncture Proof Sterile Blade package that can be autoclaved.

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for **MASTITIS** *of*

dry and lactating cows

NEW SQUEEJET T.M.*

single-dose dispenser for

FURACIN® SOLUTION *veterinary*

brand of nitrofurazone

- delivers one full dose
- is discarded after using
- saves time
- is convenient, especially when a number of cows are to be treated
- unique package

*design patented

FURACIN has been shown to be strikingly effective in controlling mastitis under field conditions.[1,2] Of 7,123 lactating cows with acute mastitis, fair to excellent results were obtained in 5,597 (78%). Of 3,418 dry cows which had had mastitis during their previous lactating period, fair to excellent results were obtained in 3,104 (90%).

SUPPLIED A water-miscible liquid of FURACIN 0.2% in polyethylene glycol and water. Single-dose SQUEEJET disposable dispenser of 30 cc. Still available, bottles of 500 cc. with rubber stopper and 1 gal.

1. Mires, M. H., and Chadwick, R. H.: Vet. News 10:3 (Jan.-Feb.) 1947. 2. Mires, M. H.: J. Am. Vet. M. Ass. 117:49 (July) 1950.

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NITROFURANS—a *new* class of antimicrobials— neither antibiotics nor sulfonamides

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A competitive examination for appointment of veterinary officers to the Regular Corps of the United States Public Health Service will be held in various places throughout the country March 31, April 1, 2, 3, 1959. Appointments provide opportunities for career service in clinical medicine, research and public health. Examinations will include an oral interview, physical examination and comprehensive objective examinations in the professional field.

Application forms may be obtained by writing the Surgeon General, Public Health Service, Washington 25, D. C. Completed application forms must be filed in the Division of Personnel no later than February 20, 1959.

Triple Vaccine

A triple vaccine for leptospirosis, virus diarrhea and infectious bovine rhinotracheitis is the first triple vaccine in veterinary medicine.

Two Dependable Proven Specifics...

PRO-BRAND KZ
ANTISEPTIC FUNGICIDE

Chronic mycotic dermatoses can now be controlled. Pro-Brand KZ penetrates thoroughly, killing infective organisms. Healing progresses fast because ingredients do not react with tissues. Wetting agents in KZ aid removal of crusts, and mild stimulants accelerate growth of new skin and hair. Available to veterinarians in 4 ounce or gallon bottles.

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Controls Diarrhea from Dietary or Digestive Causes

For prompt, effective relief of intestinal disorders administer this pleasant tasting, non-toxic demulcent, containing Kaolin, Bismuth subcarbonate and Pectin. Kabtin was specificially developed for effective control of dietary diarrhea in cattle, sheep, swine, colts, and dogs. Available in 8 ounce or gallon bottles to veterinarians only.

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CURTS **BOVIDOTE** CURTS

Laxative—Antacid—Detoxicant—Stimulant
(100% active ingredients)

℞ Each pound contains: Anhydrous magnesium oxide (quantity sufficient to make 1 gallon of milk of magnesia) with a therapeutic dose (8 oz.) of sodium thiosulfate; plus sufficient quantity of tartar emetic and nux vomica for rumen stimulation

The original formula emphasizing the chemical detoxifying action of sodium thiosulfate together with its laxative action

DOSE: Adult cows 1 lb. suspended in 1 to 3 gallons water via stomach tube

OFTEN IMITATED — NEVER EQUALLED

PACKAGES: Carton of 12—1-lb. sealed polyethylene bags
25 lb. plastic lined fiber drums

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Manufacturers of Veterinary Pharmaceuticals Since 1918

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in chronic respiratory disease of poultry

FUROXONE® AERODUST

BRAND OF FURAZOLIDONE

VETERINARY

provides bactericidal action at the site of infection

A new dosage form for inhalation, FUROXONE AERODUST VETERINARY is a fine, light, yellow powder that contains Furoxone 25%, and remains suspended in the air for 30 minutes or longer. It is indicated for the treatment of chronic respiratory disease (C.R.D. or air sac infection) in poultry flocks.

Administration: For each 1,000 chickens, empty the contents of one 100 gram carton into a dust applicator such as a Hudson Admiral Duster No. 766. In dim light or darkness, direct dust cloud about 2 feet over birds from a distance of 5 to 6 feet from nearest bird.

Supplied: Carton of 100 Gm.

Other Eaton veterinary preparations for poultry:

FUROXONE CONCENTRATE VETERINARY—Feed additive for salmonelloses, histomoniasis, hexamitiasis, synovitis and control of secondary invaders associated with chronic respiratory disease and non-specific enteritis.

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The proven effective dietary food in the management of diseases commonly affecting mature dogs. Dispensed only by graduate veterinarians.

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New, potentiated broad-spectrum antibiotic activity with

COSA-TERRAMYCIN*

oxytetracycline with glucosamine

more consistently effective
more rapid response
better toleration
no increase in dosage

A recent double cross-over study[1] in dogs showed marked increases of blood levels—up to 40% higher with Cosa-Terramycin as much as 5 hours after administration. Further studies with radioactive C^{14} tagging conclusively confirm that glucosamine-antibiotic potentiation more than doubles the height of those levels obtained with the broad-spectrum antibiotic alone.[2]

DOSAGE: The usual effective oral dosage is based upon a daily total of 25 to 50 mg. per pound of body weight in small animals and 5 to 10 mg. per pound of body weight in large animals, given in divided doses every 4 hours.

SUPPLY: Capsules—250 mg. (yellow) bottles of 100
Capsules—125 mg. (yellow) bottles of 100

*Trademark

Pfizer *Science for the world's well-being*

REFERENCES: 1. Cross-over studies by Dr. B. A. Sobin, Pfizer Laboratories. 2. Snell, J. F. and Garkuscha, R., Proc. Soc. Exper. Biol. & Med. *98*:148-150, 1958.

DEPARTMENT OF VETERINARY MEDICINE
PFIZER LABORATORIES
Division, Chas. Pfizer & Co., Inc., Brooklyn 6, N.Y.

FERAJECT'S EXCLUSIVE FEATURES

★ Feraject protein complex-iron injectable contains 100 mg. per 2cc, which gives baby pigs the all important amount of iron necessary for the prevention of iron deficiency anemia.

★ Aside from the high concentration of complexed iron, Feraject contains NEOJEL as an adjuvant with a stabilizing effect, Vitamin B_{12} as a growth stimulant; and Pyridoxine Hydrochloride (B_6) as an aid to amino acid metabolism.

★ Feraject is non-toxic and when used as directed, will not disrupt the homeostatic condition present in the normal animal.

★ The recommended therapeutic dose of Feraject is 2cc. For prophylaxis of pig anemia, the dose may vary from 1cc to 2cc depending upon the degree of iron deficiency.

★ Feraject is available exclusively to veterinarians in 30cc (15 dose) and 100cc (50 dose) vials.

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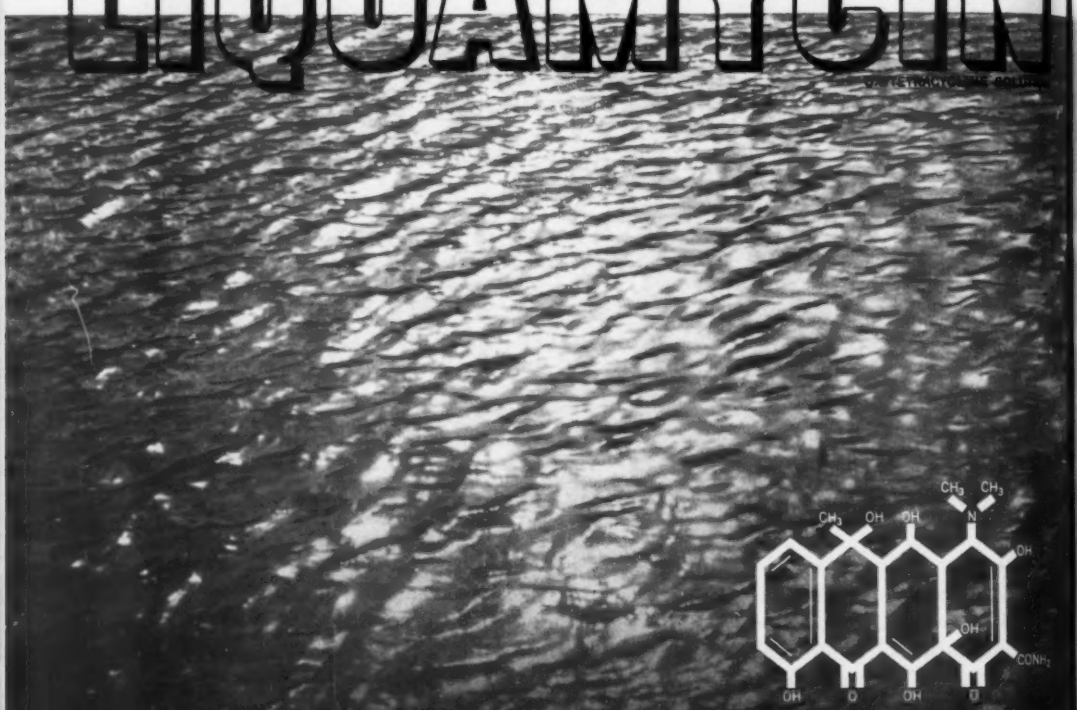
OXYTETRACYCLINE SOLUTION



a sparkling-clear solution of the broad-spectrum antibiotic, oxytetracycline

The diversified conditions under which veterinary medicine is practiced call for a broad-spectrum antibiotic designed for rapid systemic effect and offering the maximum in convenience, economy and versatility.

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Convenient—A sparkling-clear, stable solution for easy, instantaneous use.

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Indiana Nutrition Conference

A Symposium on Therapeutic Nutrition will be held in Indianapolis, February 25. This is the second annual meeting held under the sponsorship of the Indiana Veterinary Medical Association.

The program promises to be helpful to practicing veterinarians. Midwestern practitioners should avail themselves of this opportunity to get some practical information in nutrition.

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Located in Central Illinois between city of 100,000 and a large air force base. 40 inside and 40 outside runs. Facilities for feeding, grooming, and bathing. Modern home and efficiency apartment. Total unit only 3 years old. Designed also for use as Veterinary hospital. $52,250.00. $8,500.00 to handle.

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Automatic projectile type syringe delivered by a specially designed pneumatic rifle.

Excellent for immobilizing, capturing, restraining or treating wild or feral animals.

Effective for animals of all sizes. From one to ten milliliters of any liquid compound can be injected into an animal from distances up to approx. 50 yards.

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Prevents and overcomes respiratory and circulatory inadequacy prior to or during surgery. Hastens post-operative recovery. Overcomes shallow respiration and sluggish circulation in old, toxic and debilitated animals when given orally.

Dose: Small animals ½ to 3 cc. METRAZOL by injection, as necessary.
One METRAZOL tablet orally three or four times a day.
Large animals 10 to 25 cc., intravenously, repeated as required.

Available in: Ampules, (100 mg. per cc.) 1 cc., 6's and 100's.
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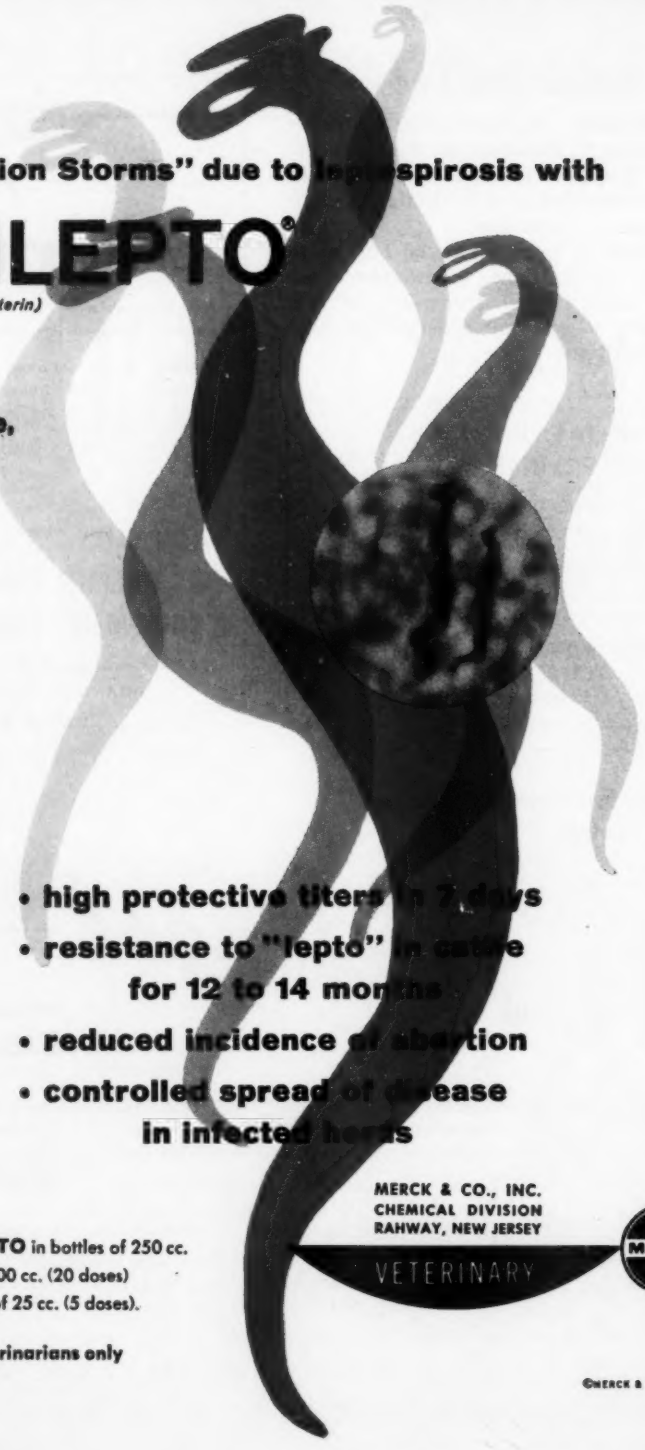
Stop "Abortion Storms" due to leptospirosis with

ANTILEPTO®

(Leptospira pomona bacterin)

Prevents and controls "lepto" in cattle, swine, horses and sheep



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- **controlled spread of disease in infected herds**

ANTILEPTO in bottles of 250 cc. (50 doses), 100 cc. (20 doses) and in vials of 25 cc. (5 doses).

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Curts Opens Memphis Branch

Curts Laboratories of Kansas City announces the opening of its Memphis Division. A. T. Morgan will be in charge of operations. The move is being made in order to provide the profession with better service on pharmaceuticals, biologicals, instruments and other supplies.

McMillan Joins Sterwin Chemicals

Dr. Thomas O. McMillan has joined the staff of Sterwin Chemicals Inc. in the capacity of poultry specialist.

Before coming to Sterwin, Doctor McMillan was associated since 1953 with the Animal Industry Section, Agricultural Division, of American Cyanamid Company. He practiced veterinary medicine in Oklahoma from 1945 to 1953. Previously, he was assistant State Veterinarian in Oklahoma, and County Agricultural Agent in Texas from 1940 to 1942.

Dr. McMillan received the DVM degree from Texas A & M College.

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You'll find THERAPOGEN virtually free of side effects and toxicity. Its completely effective yet mild cleansing action has been found excellent for obstetrical work by veterinarians for many of the finest horse breeding farms in Kentucky. Inexpensive THERAPOGEN may be ideal for your needs, also.

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2

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EVA does not seed premises, will not cause undesirable vaccination reactions, and cannot cause infection in swine or man.

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EVA can be used on all or part of drove, and on pregnant animals if accorded reasonable care. Cyclic vaccination establishes year-around protection in both breeding and market herds. Only a 2 cc dose regardless of age or weight.

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- **Vermifugal and purgative in action, NEMURAL is particularly effective in dogs and adult cats. Moreover, *it acts quickly*.**
- May be administered without a preliminary starvation. Administration usually not followed by emesis.
- Definite dosage: One 18 mg. tablet for each 8 lb. of body weight.

Literature and detailed information supplied on request.

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LEPTRIN offers dependable immunity lasting more than a year. New processing techniques increased the number of organisms per dose. Immunizing power was raised further by adsorbing chemically inactivated organisms on aluminum hydroxide. LEPTRIN is safe. It cannot cause the disease or produce a carrier state. A 5 cc. dose is safe for use in either swine or cattle.

A supply of LEPTRIN in your clinic will enable you to act quickly and effectively against leptospirosis — a costly, widespread disease. For your convenience, LEPTRIN is supplied in 5-, 20-, and 50-dose vials.

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